

COOP'S TECHNOLOGY DIGEST

-A Timely Report On The *World* Of Communications-

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COOP'S TECHNOLOGY DIGEST

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The delivery of television programming via satellite relay is one of the most environmentally friendly uses of the radio frequency spectrum ever devised. A fractional amount of transmitter power isolated in space 35,881km above the earth's equator is directed back to earth with telescopic pinpoint accuracy to a selected segment of earth. The concept, loosely proposed in the 1930s, gelled into a practical thesis with publication in Wireless World (October, 1945) of a paper by then little known technology author Arthur C. Clarke. His detailed analysis (Extra-Terrestrial Relays; Can Rocket Stations Give World-wide Radio Coverage?) used a favourite Clarke tool (mathematics) to establish the soundness of the concept. He envisioned a trio of satellites, suspended in near-gravity-equilibrium at an altitude near 35,881km directly above the equator and spaced around the globe at 120 degree intervals. Each would 'cover' or provide transmission to approximately 40% of the earth's surface.

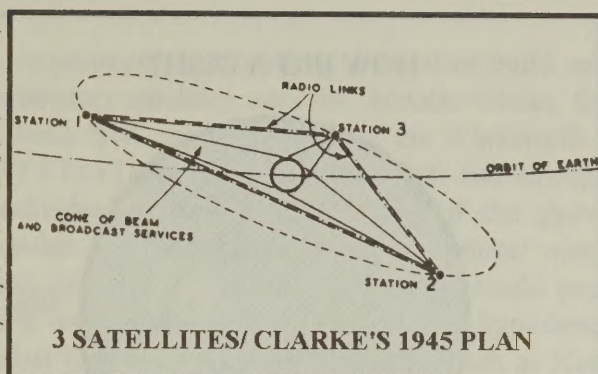
Clarke's proposal established the goal and provided sound scientific reasoning and fact to support his hypothesis. It would be nearly 20 years hence before technology provided the tools to test the theory.

We have lived with satellite relay of microwave (and other frequency band) transmissions long enough to now take them for granted. New Zealand 'interconnected' to the world Intelsat network in July 1971 with commissioning of the Warkworth 1 (30 metre) dish facility. Warkworth 2 (30.48 metres; July 1984), Wellington 1 (18 metres; April 1986) and Rangiora 1 (18 metres; April 1986) followed. Telecom, the 'official' New Zealand participant in Intelsat, presently operates 8 satellite earth stations including one each at Scott Base (Antarctic) and the Chathams.

By international agreement satellites operate in frequency bands reserved for such applications. In most portions of the world the satellite 'bands' are little or not used for terrestrial services to ensure global wide satellite reach without interruption from interference. The original frequency ranges set aside for satellites were 3.7 - 4.2 GHz (3,700 to 4,200 megahertz) as the 'downlink' (satellite to earth) and 5.9-6.4 GHz for the 'uplink' (earth to satellite). The uplink range is of interest only to those who transmit to a satellite; for most users the only concern is the downlink range since this is where their receiving equipment must function. Based upon a 1940's designator system, this frequency range is commonly called 'C-band'. Until the late 1970s C-band carried virtually all of the satellite 'traffic' in the world. However, following a World Administrative Radio Conference (WARC) meeting in 1979, additional frequency ranges were added to C-band to allow for expanded services. These 12 GHz (12,000 MHz) frequency bands (and there are several

different band segments here) are commonly called Ku band.

Clarke's original paper may have been motivated by two concerns. With World War Two winding down, the promise of 'national television' in the UK (Clarke's then home) loomed ahead. His own mathematical analysis of the VHF bandwidth required to expand television to every portion of the UK suggested the country might run out of spectrum before television reached all of the countryside. He based this on the limited range of VHF television signals and projected how many stations could operate in the spectrum without causing interference to one another. He suggested 'one space-located radio relay (satellite TV) channel' as a substitute for hundreds of terrestrial TV transmitters.



Alas, the demand for a national television service occurred far in advance of the technology required to place even one TV channel 'in orbit'. And his second motivation, the internationalisation of television as a communications medium, awaited the first functional satellite. In Clarke's plan, satellites stationed at 30 degrees (east), 150 (east) and 90 (west) would allow an appropriately designed television receiver to tune in TV from virtually any point on the globe. Clarke even suggested a frequency range (in the then-largely unexplored microwave region) and a power level per satellite transmitter (based upon his own careful calculation of 'links') which today would seem better than 90% accurate to what we have in use. His was a quite amazing thesis nearly 20 years in advance of development of the relevant technology.

The first generation Intelsat satellites were designed to combine the necessary electronic platforms to serve the relay of radio and television programming, data or voice narrow band intelligence, or high speed data. Then state of the art called for a 5 watt satellite transmitter to radiate (transmit) by relay earth originated transmissions directed towards it. Engineers responsible for the first satellite systems were very concerned about failure because of a fear of the unknown. For this reason they added 'safety margins' to their equations, uncertain what to expect in practice. The Warkworth 1 antenna, for example, some 30 metres in diameter, was in its day the 'standard' terminal. The structure, with 270 tonnes of steel, if replaced today could be 1/3rd the size (and less than 3% the weight) with performance virtually identical to the original monster antenna.

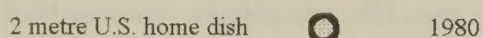
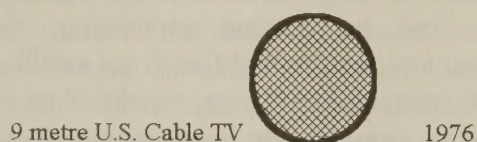
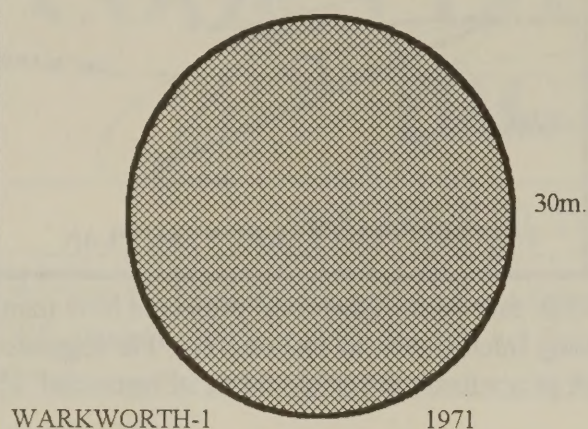
Given the 'Warkworth 1' mentality of the late 60s and early 70s (and the massive capital budgets that went with the 'safety-first' engineering approach), those who suggested smaller dish antennas might provide useful service were given little attention.

THE FIRST SMALLER DISHES

At a time where Warkworth-style 30 metre dishes were 'the standard' an American plan to allow cable television systems to 'experiment' with dishes in the 9 to 11 metre class (1975) was considered heretical by many in the industry. When the 9-11 metre class did produce high quality pictures it was soon obvious the threshold had not been found. How low (small) could dishes go?

The answer by 1976 was 6 metres; by 1978, 3 metres. In two more years it was 2 metres. All of this was happening at 'C-band' at a time when Australia, Canada and several European countries were paper-designing futuristic Ku band satellites which would, by design, function with dishes down to the 0.5m size range.

HOW BIG A DISH?



(Antennas shown to scale)



WARKWORTH 30m (C-band)/9m (Ku-band)

Between 1976 and 1982 several separate but related developments were following parallel end-result paths:

1) Satellite antennas were shrinking because antenna efficiency was improving; smaller antennas were capturing as much signal as prior generation larger antennas.

2) Satellite receiver systems were making dramatic improvements in sensitivity; dishes that produced noise-polluted pictures with 1976 receivers were creating perfect pictures with 1980 receivers. And the receivers continued to improve right through the mid-80s.

3) Satellites, typically with a operational life of 3 to 7 years, were being replaced with more powerful next generation versions. The 1970-1978 era 5 watt transmitters grew to 8-10 watts in 1980, and today 20 watts (on C-band) is considered pretty standard. With more satellite power, stronger signals on earth. Which, with better dishes and more sensitive receivers, quickly translated to smaller (and smaller) dishes.

At the regulatory level, there had been tacit agreement amongst nations that as satellite communications evolved two separate 'classes' of service would be available. 'C-band' satellites would be 'commercial', for the TVNZ/Warkworths of the world. Ku-band would be for the back garden/rooftop (0.5 metre or smaller) aerial which individual home viewers might install. In 1975 almost nobody envisioned C-band terminals proliferating in backyards; due in main to the almost blind allegiance to the 'standard line' that lacking a dish in the 30 metre class satisfactory results were not possible. The regulators were certain that 'home dishes' would await the introduction of Ku-band satellites which by design would be for backyard reception. *They were wrong.*

EARLY PROGRAMMING

Closely following Clarke's 1945 thesis, Intelsat (a consortium of nations created to build and operate a global satellite relay service) placed geostationary satellites over the Atlantic Ocean, the Pacific and the Indian in what is now named the 'Clarke Belt'. Earth stations, of the Warkworth 1 class, were commissioned and installed by national PTTs (Telecom in New Zealand) and through the Intelsat 'network' and PTT ground stations individual nations became a part of the global circuit. Intelsat believed, in the early 70s, that outside of the Russian 'block of nations' every telephone call, every FAX message, every television programme relayed via satellite would pass through an Intelsat satellite. A number of countries wrote legislation to support this hypothesis actually making it illegal for anyone other than Intelsat (and their signatory countries such as New Zealand) to authorise non-Intelsat ground terminals. It was a closed club.

Canada broke ranks by creating its own national series of satellites (called ANIK). Canada argued that its very far northern regions, technically so close to the north pole as to be out of reach of even Intelsats, required real-time communication services. ANIK was the answer. Intelsat reluctantly agreed. The ice broken, U.S. corporations Western Union (creating Westar) and RCA (creating Satcom) received approval to build 'private' satellites. Indonesia and Australia would follow the same trail by the mid 80s. And Russia responded to Intelsat by expanding its own network of G(h)orizont/Statsionar satellites linking 'member states' such as Cuba and Northern Vietnam. The Intelsat exclusive 'club' was history.

Here in the South Pacific an early world satellite network known as AFRTS (Armed Forces Radio & Television Service) operated by the American military and using an Intelsat transponder offered an opportunity to New Zealanders to witness, in real time, television covered news, sports and entertainment programming not available on terrestrial networks. During the period 1983-1986 a number of New Zealand firms toolled up to produce 5 to 9 metre diameter dish antennas built almost exclusively around the availability of the AFRTS programming. Although there were



SKELETONS FROM OUR PAST / 7m antennas for Intelsat, Aussat decay on Hamilton motel roof

West

SPACENET 2	SATCOM F2	GALAXY 2	SATCOM F4	TELSTAR 2	SPACENET 3	GALAXY 3	TELSTAR 1	GALAXY 6		ANIK 2	ANIK 1	MORELOS 1	SPACENET 1	TELSTAR 3	Galaxy 5	SATCOM F1	GALAXY 1	SATCOM C1	
1	OCCASIONAL VIDEO	OCCASIONAL VIDEO	SPORTSCHANNEL PREMIERES ACTION PPV (SAT-PPV)			SHOWTIME PREMIERES	USLE		1					TYN WEATHER 1	DISNEY (ABC) PLAYBOY (coming soon) TCN (Trendy Broadcasting Net) SCI-FI CNN Super TBS (Atlanta) WGN (Chicago) MOR Music FAMILY CH (East) DISCOVERY CNBC TWC-WEST The Movie Channel HBO (East) CINEMAX (West) THI TNN (The Nashville Network) USA (Black Entertainment) MEU-TV HEADLINE ARE (Arts & Entertainment) SHOWTIME	ABC	COURTYN CHANNEL	BUSINESS OPPORTUNITY	
2	UNIVERSITY NETWORK	WRAL (CBS)	OCCASIONAL VIDEO		NETV	FOX NETWORK	CBS (WEST)		2	TSN	(MEXICO CITY)	UNIVISION FEED		TYN THREAT 3		LEARNING CHANNEL	VIDEO NEWS	2	
3	VOICE OF AMERICA	OCCASIONAL VIDEO	AGRI-NET		WISN-TV (WISN)	OCCASIONAL VIDEO	WARNER BROS. VIDEO		3	OCCASIONAL VIDEO		SPORTS FEEDS		TYN THREAT 3			VIDEO NEWS	3	
4		OCCASIONAL VIDEO	CABLE VIDEO SPORTS PPV						4	FRIST CRUISE				TYN THREAT 4		REUNITE 2 (PPV)	EMERY 2	SPORTSCHANNEL PACIFIC	
5	CHANNEL AMERICA	OCCASIONAL VIDEO			WISN-TV (WISN)	RTV (DALLAS)	HUGHES TV NET	PRO SPORTS FEEDS	5	CBC DISPORTS		SPORTS FEEDS		TYN THREAT 6		VEIN	SHOWTIME (WEST)	5	
6			MSG			ABC	HOLLYWOOD CHAPEL NET	NCH	6	MUCH MUSIC		OCCASIONAL VIDEO		TYN THREAT 7		PPV ON	VIDEO NEWS	6	
7	MAIN STREET NETWORK	ALL NEWS CHANNEL	OCCASIONAL VIDEO	SPORTSCHANNEL NEW YORK	CBS (EAST)	ACTS	CBS (EAST)	CBS FEEDS	7	CBC		HEALTH & SCIENCE NET		TYN THREAT 7		UNIVISION (SPANISH)	FOOTBALL	7	
8		EMSAI (VOX)	SUPERSTAR GUIDE		HSN1		OCCASIONAL SPORTS	CTNA	8	EMSAI-TV (CANADA)	CTV TSN SPORTS	XIMP (MEXICO CITY)		TYN THREAT 8		QVC NETWORK 2	CARTOON NETWORK	8	
9	TELEMONDO NETWORK		CNN FEEDS	SPORTSCHANNEL CHICAGO	WISN (WISN)	QVC NETWORK	KEYSTONE FEEDS	PRO SPORTS FEEDS	9	WISN-TV (CANADA)	OCCASIONAL VIDEO	MULTISPORTS NETWORK		TYN THREAT 9		TRAVEL CHANNEL	SHOP AT HOME	9	
10	ECO GALAXYVISION	OCCASIONAL VIDEO	VALUEVISION	ABC (WEST)	EWTV	ABC (EAST)	AGRIVISION & SPORTS		10	WISN-TV (DETROIT)	NEWS & SPORTS					VIDEO NEWS	HSE ADVERT	10	
11	ESPN SHOPPING	HOME VIDEO	OCCASIONAL X-FLY PLUS	SPORTSCHANNEL QV	ABC UNIVERSITY	MIND EXT (QV)	ABC		11	CBS NORTH PACIFIC			SPORTS FEEDS	OCCASIONAL VIDEO		PRIME NET FEED	Channel TV	11	
12	OCCASIONAL VIDEO	WISN (WISN)	INTERNETAL CHANNEL		HUSTAR (QV)	SHOWTIME PROMOS	ABC (EAST)	OCCASIONAL SPORTS	12	GLOBAL TV	CTV NETWORK	TSN LATIN AM		OCCASIONAL SPORTS		COURTYN NETWORK	OCCASIONAL VIDEO	12	
13	NASA CHANNEL	VIDEO TELECOURSES	PRO SPORTS FEEDS	NECN	UNITED VIDEO	WEATHER CHANNEL	TURNER PREMIERE	OCCASIONAL SPORTS	13	SUPERCHANNEL (OCCASIONAL)	OCCASIONAL SPORTS	GUADALAJARA TV	KIN	PRO SPORTS FEEDS			QVTV	PROSTAR VIDEO	13
14	OCCASIONAL VIDEO	PRO SPORTS FEEDS		SPORTSCHANNEL FLORIDA	HBO (WEST)	C-SPAN 2 SENATE	FAMILY NET		14	QVTV (MONTREAL)	OCCASIONAL VIDEO	XHTV (MEXICO)				FAMILY CHANNEL	SHOP AT HOME	HBO (MONTREAL)	14
15	OCCASIONAL VIDEO			SHOP AT HOME	RTLA (LOS ANGELES)	WISN 1	CBS NEWS FEEDS	WORLD HARVEST WISN-TV		FRIST (CHICAGO)		XWISN-TV (MONTREAL)	OCCASIONAL SORTS			E1 ENTERTAINMENT	WISN (WISN)	VACATION NETWORK	15
16	OCCASIONAL VIDEO	PRO SPORTS FEEDS		SPORTSCHANNEL HBO	CBS (WEST)	YVESVILLE CRUISE 2	ATS	TEXAS TV	16	CBS NEWSWORLD	CTV NETWORK					WISN (WISN)	SHOWTIME (WEST)	CALIFORNIA HOLDS	16
17	OCCASIONAL VIDEO	OCCASIONAL VIDEO	SHOP AT HOME			RTV (EAST)	OCCASIONAL SPORTS	AMERICAN ENTERTAINMENT	17	CBS LONDON	TV-5 (FRENCH)	WISN SAT NET	FLIX MOVIES			LIFETIME (MONTREAL)	NEW HOSPITAL	PRIME SPORTS	17
18	GREAT AMER BROADCASTING	UNIVERSITY OF VA	WISN (WISN)	CBS (EAST)	SPORTSTEAM	RTV (WEST)	KEYSTONE GROUP W	HRK (TOKYO)	18	CITY-TV (EDMONTON)	OCCASIONAL SPORTS	SAT SHOW	FOX (EAST)			TNN (The Nashville Network)	PRIME SPORTS	18	
19			VA TECH UNIVERSITY	DIGITAL MUSIC EXPRESS	CBS (LANT)	SPORTSCHANNEL (EAST)	KEYSTONE FEEDS	OCCASIONAL SPORTS	19	CBS NORTH (ATLANTIC)	CHNC	OCCASIONAL SPORTS	OCCASIONAL VIDEO	SHOWTIME 2		USA (Black Entertainment)	GALAXYVISION (SPANISH)	SPORTSCHANNEL (LOS ANGELES)	20
20	ARTS	FRENCH ONE VIDEO		MONTAGAL CHANNEL	CBS	TYN-STAR PROG	G.A.BROADCASTING (EAST)	LIFETIME TV NETWORK	20	CBS (MONTREAL)	TYN	OCCASIONAL SPORTS		TYN THREAT 19				HRK (TOKYO)	21
21	TELEMONDO FE BLUR	ASO	OCCASIONAL VIDEO		CRIMINAL MIND	FASE (DETROIT)	YVESVILLE CRUISE 1	MOVIE GREAT NETWORK	21	WISN-TV (DETROIT)									
22	GREAT AMER BROADCASTING	TY JAPAN (TOKYO)	HYRA OCC SPORTS	PLAYBOY (MONTREAL)	CBS (QV)	LYTH	HOLLYWOOD (WEST)	CARIBBEAN SUPERSTN	22	BCTV (VANCOUVER)	OCCASIONAL SPORTS					FOX NEWS FEEDS			
23	SOLA RADIO FRN	HRK TOKYO WORLDWIDE	OCCASIONAL VIDEO		ITS (MONTREAL)	COURTYN CHANNEL	OCCASIONAL VIDEO	BYU SPORTS	23	WISN (DETROIT)						FOX (WEST)			
24	GREAT AMER BROADCASTING	HRK TOKYO WORLDWIDE	OCCASIONAL VIDEO	HSE ENTERTAINMENT	COMPUTER NETWORK	C-SPAN (HOURS)	PRO SPORTS FEEDS	PRO SPORTS FEEDS	24	CBS PARLIAMT	CTV NETWORK		SCOLA TSN NEWS	TYN PRODS					

GRID-GUIDE TO 18 NORTH AMERICAN SATELLITES / 330 PROGRAMMING CHOICES!

sporadic bureaucratic rumblings threatening to outlaw such terminals, the government was preoccupied with terrestrial economic problems and no legislation was ever adopted. Firms formed to build and/or sell these terminals flourished for several years but few still exist today.

SCRAMBLING

In 1979 there were fewer than 200 'home satellite dishes' in America. By 1982 the trade association SPACE counted more than 100,000 such terminals. In 1985 the number was in excess of 2,000,000 and growing at a rate of more than 100,000 per month. Terminal systems that cost upwards of US\$15,000 in 1979 were selling in completely boxed 'install it yourself on a Saturday afternoon' kitsets for under US\$1,000 by 1985. And with dish sizes down to under 2 metres, the average American backyard or garden was having no problem finding space for the antenna.

In 1979 the then-fast growing American cable industry had 12 channels of programming relayed via satellite. By 1985, with the interim launch of many new, more powerful, satellites, the number of channels had grown to more than 60. Programming drove home dish sales; more programming, the more dishes being sold. Volume drove pricing; the more dishes being sold, the lower the price dropped. And it all drove cable programmers into a rage.

First they demanded national legislation outlawing home dishes. With two million dishes in 1985, located at mostly rural homes where television reception was poor without satellites, the voters quickly convinced legislators that outlawing dishes was not the answer. The cable programmers had two arguments:

1) Cable subscribers paid money each month to receive the satellite relayed programmes. Home dish owners paid nothing, after the purchase of their dish systems. If the 100,000 per month home dish sales continued, in a very few years the prices would drop so low that even people with cable

available would rather pay money one time to acquire a dish system than to continue to pay monthly for cable programming.

2) If that happened, the cable programmers would lose customers, the money supply that kept the cable programmers going and growing would dry up, and the cable programming would stop.

The solution was scrambling; make the satellite relayed programmes unusable by encoding the picture (and often the sound as well). Anyone who wished to continue receiving the programming, including the home dish terminal owners, could pay for their service. Now the cable subscriber and the home dish 'subscriber' were on the same level playing field.

From 1986 until 1989 the scrambling solution was implemented. Not all satellite programmers did scramble; not all existed on cable subscriber revenue (many being advertiser funded) and they saw no reason to cut off several million home viewers by scrambling. If you lived in America today (or Canada or Mexico et al) and had a 3 metre dish in your backyard you would have direct access to the 18 satellites shown in the reproduced guide-listing shown on page 6. On those 18 satellites there are 330 separate (operating) TV programmers (channels). Of those 330, 101 (30.6%) are scrambled (requiring payment of a monthly fee to access); the other 229 are free-to-air. Oh yes, this chart is for 'C-band' satellites only; you don't even want to know how many more channels are available if you own a 'C+Ku band' dish system!

Scrambling of AFRTS changed the Kiwi perception of satellite television. Our 'one channel' was not only scrambled, but it was also not available to you even if you were willing to pay for it. The AFRTS, reacting to complaints from national governments (Philippines, Indonesia, Australia and elsewhere) scrambled for one purpose; to prevent non-US-military installations from using their signal. As AFRTS was scrambling, CNN came on-line through a Pacific Intelsat satellite and for many its 24 hour per day programming provided a bridge (if not a replacement) for the AFRTS fare.

SATELLITE AGING

While a satellite ideally has a lifetime of 7+ years (those launched this year plan on 15 years), that is not 7+(15) years of 'troublefree' use. Other than catastrophic part failure (which today is bypassed by ground command through redundant system design), a satellite has the following weak spots:

1) It depends upon sunlight (through solar panels) for operating power and the storage of the power in batteries. Over time the batteries age (become less efficient) and the solar collection panels deteriorate. Slowly, over time, the power available to the satellite diminishes.

2) Virtually all 'stages' are now solid-state (i.e. transistorized). But the 20 watt+ transmit power amplifiers are still tube/valve type design. Called Travelling Wave Tubes (TWTs), they age like an incandescent light bulb ages. If you operate a 100 watt light bulb at 100 watts, it lasts so many hundreds of hours. If you operate the same light bulb at half wattage (50) it will last longer. So too with TWTs; a 20 watt unit operated at ten watts will last nearly twice as long as at 20 watts. But in time it will lose power and ultimately burn out; just like a light bulb.

3) Satellites launched to the magic 'Clarke-Orbit' height of 35,881km may be at a 'gravity equilibrium' point (suspended between the earth, the moon, our solar system and the universe) but they don't like it. Very small gravitational imbalances exist; just enough to slowly drag the satellite one direction or another; away from its magic spot. Even the 'power' of the solar radiation pushes on the satellite. To keep it in its magic spot (actually a 'box' some 113km on a side) the satellite carries miniature cartridges of hydrazine gas on board. These cartridges are used as a propellant to push the satellite back into its assigned 'box' whenever it drifts towards the edges of the imaginary

box. The hydrazine gas is expelled through miniature nozzles in millisecond bursts controlled from the ground TT&C (control) stations which monitor and keep track of each satellite. And over a period of years the finite quantity of hydrazine gas stored in the satellite at launch is exhausted. Without it, the satellites wander out of design-control and over time (two-three years) our Pacific Ocean Region (POR) satellites would end up in a 'tangle' just off the western coast of Peru. This 'station keeping' operation is an important part of day to day satellite 'flying'.

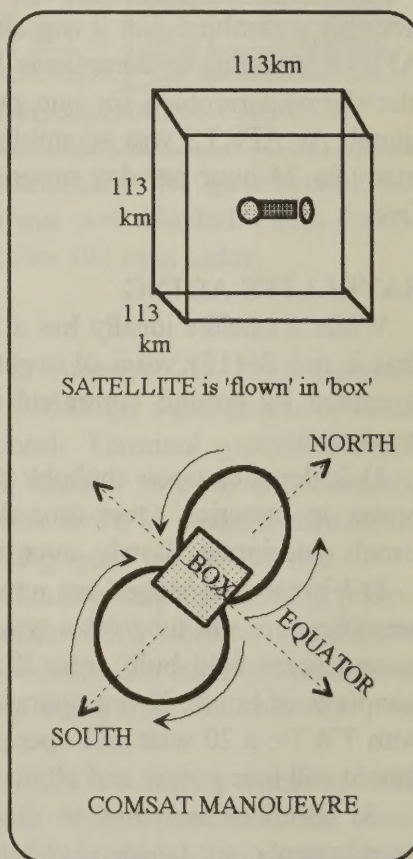
Ground monitoring the hydrazine 'inventory' is a constant parameter in satellite 'flying'. When the 'gas gauge' shows the hydrazine is running low, daily/weekly 'thruster' adjustments must be modified or the satellite will run dry and drift without purpose.

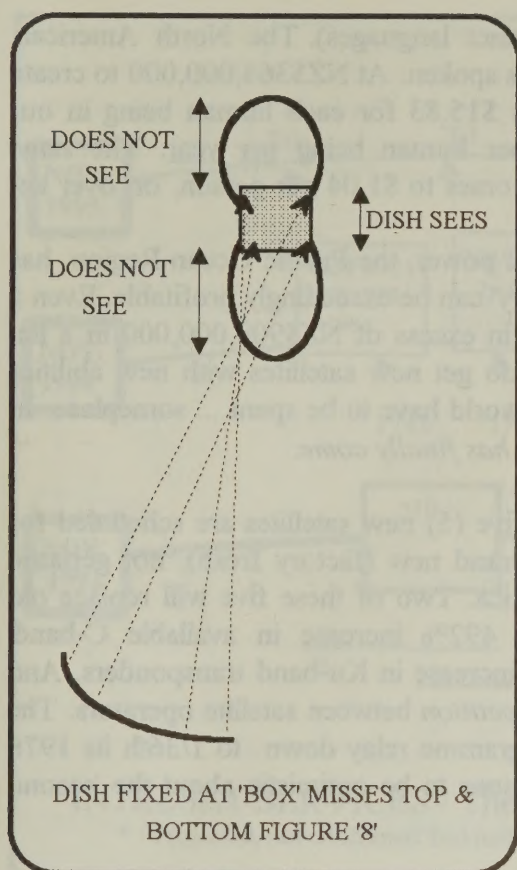
FIGURE 8 / INCLINED ORBIT SATELLITES

Between being flown in a tight 113km square box (the controlled situation), and, drifting aimlessly at the ends of its useful life, Intelsat created something they called (and patented as) The Comsat Manoeuvre. Rather than routinely firing individual hydrazine thrusters to keep the satellite within a tight (113km square) box, they fire a sequence of thrusters which causes the satellite to oscillate back and forth across the equator like a pendulum on a clock. The new flight path, typically 20-22 hours in length, is best imagined as a giant 'Figure 8'. The satellite is allowed to drift up to 4 degrees south of and north of the equator. Viewed from directly below (i.e. from the equator on the ground) it would look like the diagram here. The flight path is rather narrow east-west and while it starts off in inclined-orbit year 1 going only a degree of latitude or so north and south, at the end of several years the swing is closer to 4 degrees and increasing each year. This rations the dwindling hydrazine supply and stretches out the useful life of the satellite (other parameters still being usefully functional) up to four years.

At a price. If the satellite is swinging in a figure 8 pattern, from your perspective on earth it is no longer inside of the 'magic box' where your (dish) antenna pointed before the Comsat Manoeuvre was begun. Picture yourself looking through a 50 power telescope at a boat pulling a water skier several km distant. The boat is coming directly at you so without shifting the telescope you never lose track of it. But the skier is jumping out of the boat's wake and cutting first to one side, then back across the wake to the opposite side. At the extremes of his/her travel outside the wake on both sides you can no longer see the skier with the telescope zeroed in on the boat proper.

The Inclined Orbit Satellite wanders in and out of your satellite receiving antenna view in the same way. If you wanted to follow the skier, you'd slowly pan the telescope left and then right and then left. To follow the satellite you have to tilt the dish 'up' as the satellite flies towards you and 'down' as the satellite flies away from you. The lens on the telescope and the focusing effect of the satellite dish follow the same laws of physics.





Intelsats today capable of providing television to New Zealand (4 satellites) were launched between 1981 and 1985. Three of these four satellites are now in their 'geriatric years'; inclined orbit. That's one foot out of the satellite graveyard.

When Intelsat (or any other satellite operator) places a satellite into inclined orbit, the ground stations using that satellite have to re-equip for the new non-stationary flight path. Like the telescope, the dish focus must now move 'up' and 'down' as the satellite flies along its figure 8 path. Without this 'satellite tracking' ability, the reception from the satellite comes and goes; just like the telescope view you have in our example of the water skier.

Those 5 to 9 metre dishes created by Kiwi ingenuity in the 1980s were designed to be as low cost as possible. They were designed to stand on 'legs' pointing at a specific spot (box) in the sky and they were not designed to move or track a satellite. When Intelsat began employing the Comsat Manoeuvre for its POR satellites, these fixed-on-the-ground satellite dishes immediately lost view of their target satellites for a major part of each day. Those (few) that could be adapted for the inclined orbit pathway were modified; unfortunately, the great majority

were going to cost as much to modify as they did to build. Today hundreds of 5-6 and 7 metre steel and aluminium dishes are orphaned in motel sideyards and atop roofs throughout New Zealand; victims of the aging Intelsats and the Comsat Manoeuvre (1).

With the loss of free-to-air AFRTS, with the gradually (year by year) declining signal level from tired travelling wave tubes on board the satellites, and with the inauguration of the Comsat Manoeuvre, New Zealand's love affair with direct satellite reception withered. Reasonable (if never cheap) access to American and European satellite TV reception was over and only the very stubborn stuck with it.

UNTIL NOW

While other portions of the world now have dozens/hundreds of satellite TV channels to select from (even Bangladesh has more than 40 channels of TV), the South Pacific has stumbled along with second-hand satellites relegated to geriatric duty for more than five years. In a region of the world (from Perth to Papeete; Stewart Island to Samoa) larger than the region between Honolulu and Boston, Yellowknife (far northern Canada) and Mexico City we have fewer than 23 million people. California alone has 35% more people. In the satellite design world, space or region to be covered on the ground counts for everything. It costs just as much to create, launch and 'fly' a satellite to serve our (southern) Pacific Ocean Region (POR) as it does to cover the North American area described. Our POR satellites have 23,000,000 people they can reach (in several

(1) One clever Kiwi has figured out a low cost method of making the dinosaur 5-9 metre dishes track the inclined orbit satellites with OUT moving the dish. Contact **Brian Evans** 09-424-1067 or wait until Part 2 in December.

dozen distinct political units speaking several dozen distinct languages). The North American satellites reach more than 350,000,000 with three languages spoken. At NZ\$364,000,000 to create and launch a 24 channel 'C-band' satellite, that comes to \$15.83 for each human being in our region of the world. With a ten year lifetime, \$1.58 per human being per year. The same NZ\$364,000,000 to launch a satellite for North America comes to \$1.04 per person, or, over ten years slightly over \$0.10 per person per year.

Lacking the 'people-power', which translates to economic power, the Pacific Ocean Region has not attracted satellite investment. But ... the satellite 'industry' can be exceedingly profitable. Even a 'modest' NZ\$364,000,000 satellite can create a turn over in excess of NZ\$900,000,000 in a ten year lifetime. Sooner or later, the less profitable 'routes' do get new satellites with new abilities simply because the profits earned in other portions of the world have to be spent ... someplace. In the least populated 'coverage region' on the globe, *our turn has finally come*.

Between 01 November 1993 and 31 December 1994 five (5) new satellites are scheduled for launch and service in the POR. Four of these five are brand new (factory fresh), not geriatric discards retired from service over Europe or North America. Two of these five will replace old geriatric satellites. More importantly, there is to be a 492% increase in available C-band transponders by the end of December 1994 and a 280% increase in Ku-band transponders. And most important of all, there will (for the first time) be *competition* between satellite operators. The kind of competition which drove charges for satellite programme relay down to 1/36th its 1976 cost level by 1986 in North America. We have many reasons to be optimistic about the 'second coming of satellites' to the South Pacific.

NEWER/BETTER/LIKELY CHEAPER

Although there are officially four (4) Intelsat satellites serving the Pacific Ocean Region, two of these are in-orbit spares (i.e., geriatric themselves, resting in space should they be needed here or elsewhere in the global system). The two operational are less than 'whole'; one is inclined orbit and the other has defective channels. If you set aside the scrambled AFRTS transmission and occasional Japanese news feeds on Intelsat 511 (177 east), this leaves the satellite user here with typically 9 channels of television on Intelsat 508 at 180 degrees. That's the good news. The bad news is that of those 9, one is scrambled (ESPN), two are typically semi-scrambled (a technique called *Vidiplexing*), one is in French, two are part of the day only (including *Worldnet*), and two are reserved primarily for sending short, erratic news film material. What that leaves is *CNN*. The two remaining satellites are available in an emergency; not for 'regular' service.

Now suppose you were running *SKY TV* and wished to bring to New Zealand two new channels of programming from either North America or Europe; live via satellite. Only Intelsat presently operates here so you'd talk with Intelsat. First they'd tell you the price (which, being a monopoly, will hardly be competitive as transponders go in say North America or Europe) and then they'd tell you the bad news. *'There is no transponder space available; today.'*

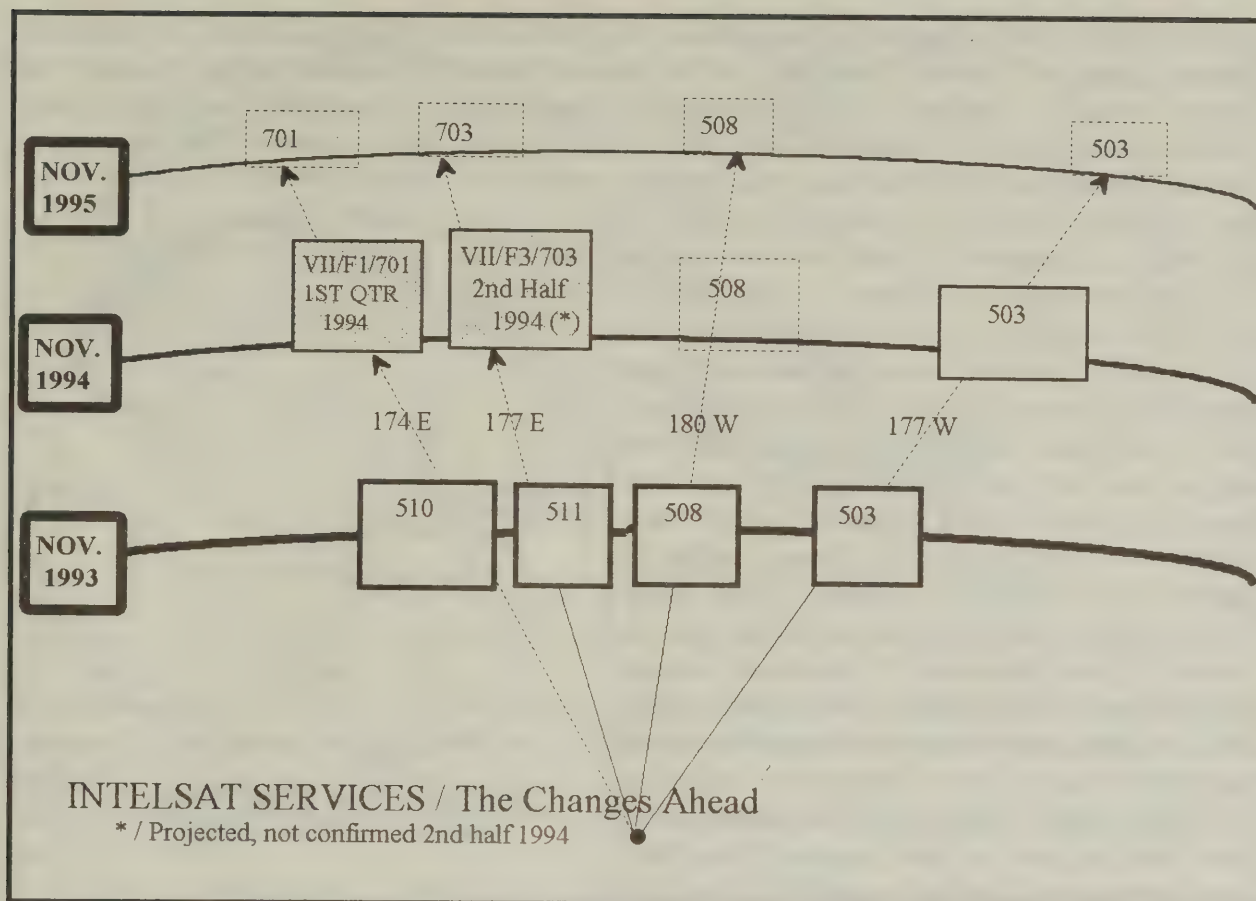
PRESENT SERVICES

INTELSAT 511/177E:

- a) AFRTS (scrambled)
- b) Occasional Japanese news feeds

INTELSAT 508/180:

- a) ESPN (scrambled)
- b) NBC news, sports (Vidiplexed)
- c) CBS news, sports (scrambled)
- d) ABC/U.S. programming
- e) Worldnet (PBS, C-Span, et al)
- f) RFO/Tahiti (French)
- g) Ch. 9/Australia (occasional)
- h) BBC/ITN (occasional)
- i) TVNZ (inward and outward bound news material)
- j) CNBC (Business news; Vidiplexed)



Fast Forward now a brief span to approximately January (February) of 1994. Intelsat has launched (October 21, 1993) the first of a brand new series of 'economical satellites' and they call it 701; for seventh series, first satellite. It is more powerful than the 'S' series and for the first time there is Ku band capacity for the POR as well. They place it at 174 east where it will replace 510; 510 will be moved in orbit to 66 east as a spare. By January (coming) Intelsat could take on new customers on either C or Ku band at 174 east, or, move some (or all) of the present TV traffic from 180 to 174. In either case we benefit because the new 701 will be geostable (requiring no tracking mechanism) and its transponders will be more powerful. Any television use of this satellite will be a plus to what we now have. But Intelsat (1A) is still a monopoly and SKY (or whomever) would still find rates 'monopolistic'.

Fast forward again; to June-July 1994. A privately owned company calling itself PanAmSat will have launched (May scheduled) the first non-Intelsat 'international' satellite for the POR. Called PAS-2, the new bird features 34 watt C-band transponders and 63 watt Ku band transponders (both more powerful than '7-series' Intelsats); 24 of each (36 MHz wide). PAS-2 was designed with 5 separate 'downlink' (transmission to earth) antenna patterns; several of which will radiate signal(s) into New Zealand. In the best-case scenario (i.e., maximum power on the transponder, and the antenna pointing at New Zealand) C-band antennas down to 2 metres in size and Ku band antennas to 90 cm will produce 'perfect' pictures. PAS-2 has an orbit position of 169 east. And for the first time Intelsat will have a direct competitor in the Pacific.

(1A)/ INTELSAT Service & Marketing FAX: 001-202-944-7930.

A brief history will contribute to an appreciation of PanAmSat. Although Intelsat very reluctantly allowed countries (Canada, Australia, et al) to develop their own 'national satellite systems' built around 'domestic' satellites (ANIK in Canada, Aussat/Optus in Australia), and, the Russian satellites aside they have fought for decades to retain their monopoly position with international satellite circuits. In 1985 PanAmSat won United States approval for the first PanAmSat satellite. It was built and launched in 1988 over the Atlantic interconnecting most of Europe, South America and North America together on both C and Ku bands. Within months Intelsat announced a rate reduction; followed by more rate reductions and then more price cutting. PanAmSat numbers suggest rates have been halved or better since they began operation. PAS-2 is the second in their series; PAS-3 will be another Atlantic satellite to expand their transponder capacity there while PAS-4 will sit above the Indian Ocean; just as Arthur C. Clarke predicted. We have every reason to anticipate lower satellite rates, and, more flexible satellite operations with PanAmSat in our area (2).

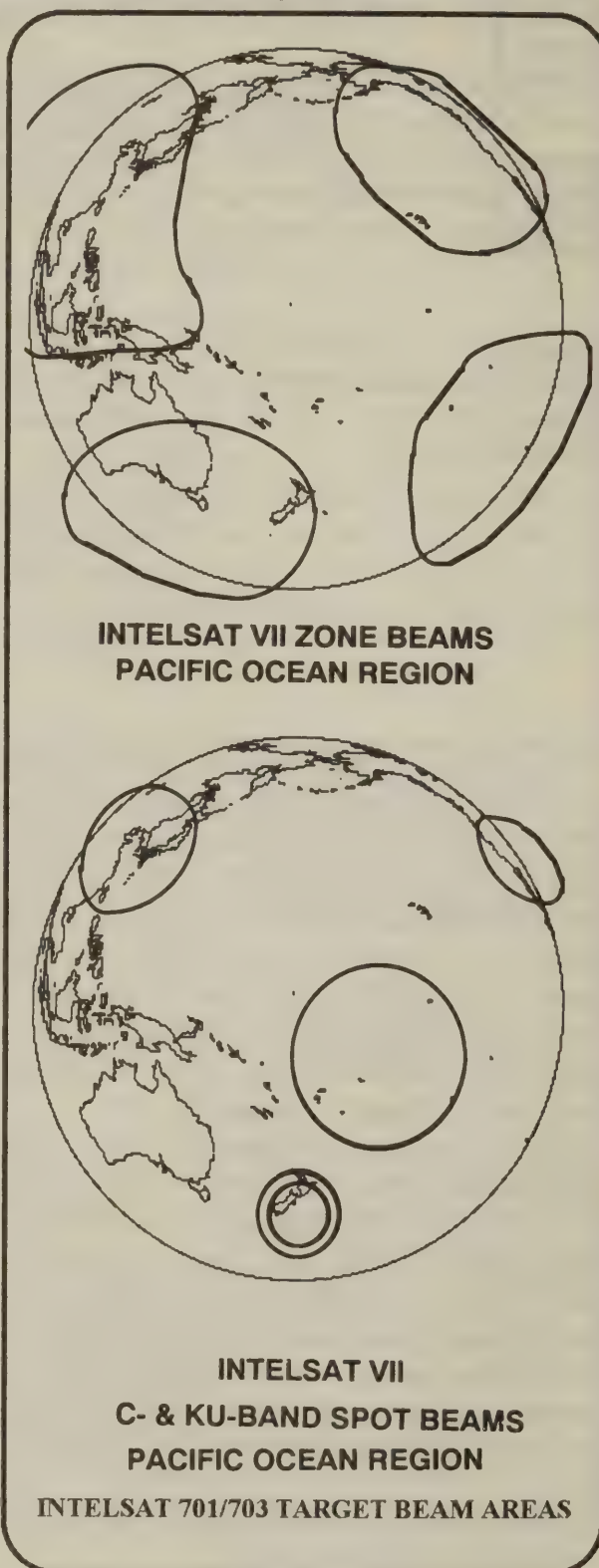
Fast forward again, to September-October 1994. Intelsat plans to have launched (June-July) a second '7-series' satellite for the POR; this one to park at 177 east (2A) as a replacement for the aged 511 series bird now there. To be numbered 703 (702 goes elsewhere in the world), it is another higher power C-band plus Ku-band satellite. The addition of 703 will net us, like 701, new higher power transponders (plus potential Ku band capacity).

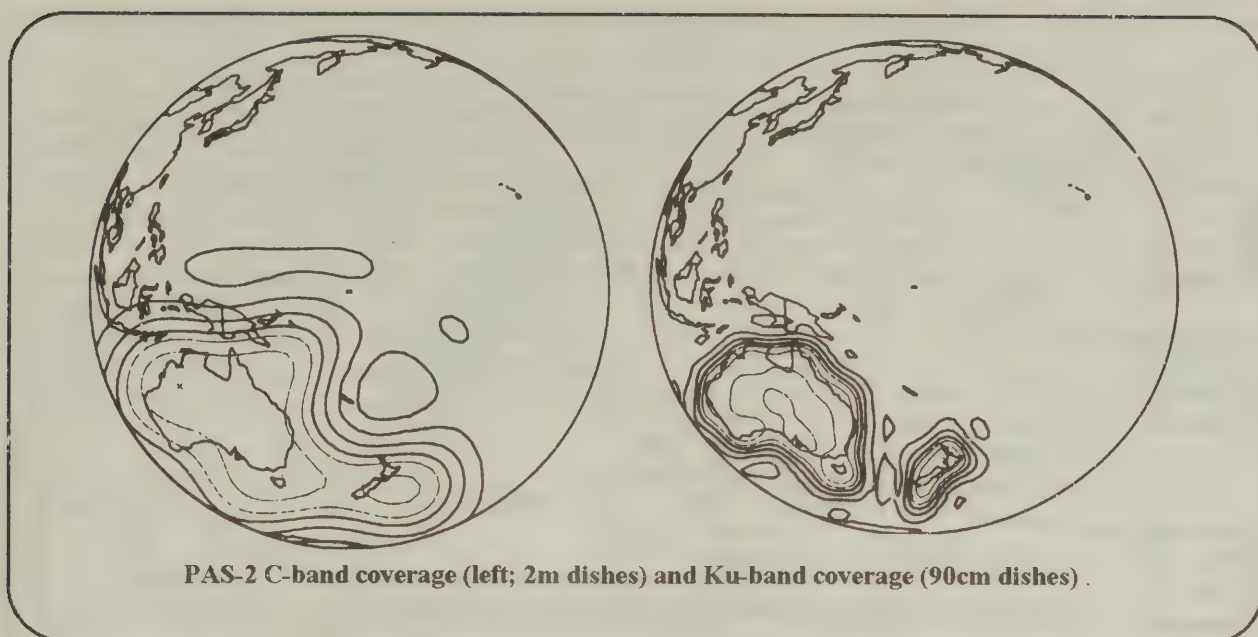
THE AUSTRALIAN CONNECTION

Australia's original Aussat series satellites (three in all numbered A1-A3) were early-design 30 watt (maximum) Ku-band birds. The original design included an 'antenna beam pattern' to serve New Zealand as well as Australia in their third (A3) series satellite. However, the transponders set aside for possible use into New Zealand (5 in all) remained essentially unused. Under the more recent Optus regime (Optus replacing Aussat as

(2)/ PanAmSat, One Pickwick Plaza, Greenwich, , Ct. 06830, USA: FAX 001-203-9163.

(2A) / 703 has scheduled mid-94 launch, not confirmed.





the owner-operator) a newer series of replacement satellites (B1-B3 ultimately) were designed; again with some (up to 8) of the transponders able to send signals into New Zealand using a 'New Zealand Beam' antenna. With 50 watts per transponder, the potential Optus signal level (called footprint) into New Zealand is such that antennas as small as 0.9m could produce 'perfect pictures' here.

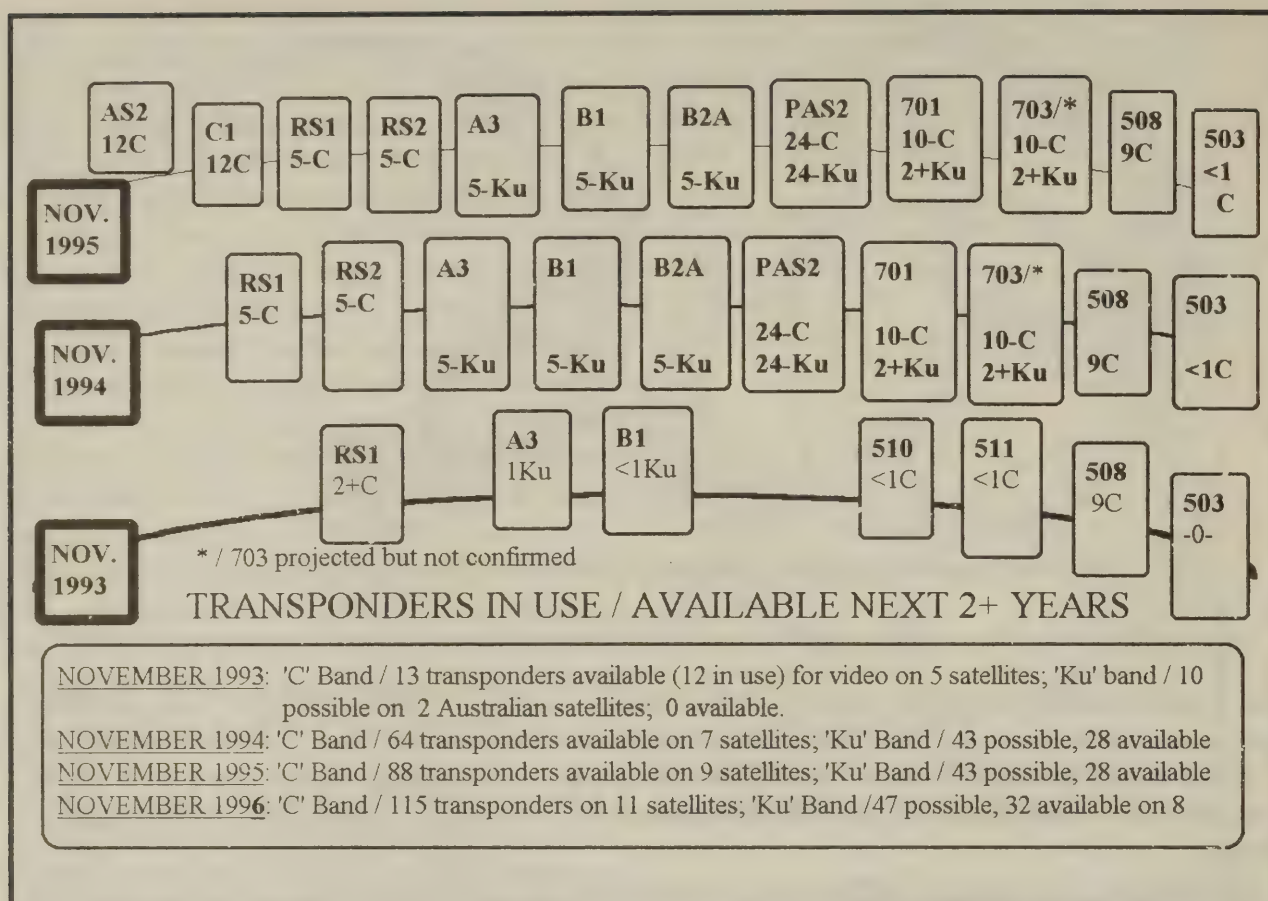
To date no customers for Optus New Zealand Beam (NZB) transponders have emerged. One NZB customer who conducted a paid-for test demonstration several years ago, using A3, found the rates to be at the threshold of pain; \$5,000 for a few hours of satellite service. Certainly long term, 24 hour per day rentals would be far less expensive but getting down to European/North American rates (typically as low as NZ\$180 per hour) has to date proven far below Optus concepts of a fair return.

Aussat satellites do employ different beam antenna patterns for different parts of Australia. One of these on A3, called the Southeast Australia/National beam, has 'spillover' into New Zealand. This means that whereas in SE Australia a dish in the 1m size range might be required, the New Zealand 'fringe coverage' from the same satellite beam is 3-4 metres in size. Aussat A3, transmitting a nightly (2 hour) Japanese-tourist oriented package of programmes to Australian motels, is receivable on at least North Island with a 3 metre dish via 'spill over'.

Unlike Aussat, Optus satellites have by design greatly contained the 'spill-over' effect and when the new B1 satellite went into service (January 1993) a number of Australian transponders previously available in New Zealand on A1 were lost with the switch to B1.

The Australian satellite programme is at the moment in some disarray.

- 1) The change over from the Aussat regime to the Optus regime has not been totally smooth.
- 2) Australia has an 'outback TV service' designed specifically for rural households and this features (by subscription) their own national ABC network. This programming is scrambled to limit reception to those who subscribe to it; a curious feature for a government subsidised television service. The market for these decoder equipped receivers has fallen off to virtually nothing and the manufacturer of the receiver stopped making them early in 1993. These B-MAC



encrypted transmissions are further at risk because B-MAC itself, as a scrambling technique, is being phased out world wide and is likely to be replaced with MPEG-2 digital.

3) While the first Optus series bird (B1) was launched without major incident (replacing in orbit Aussat A1), the second bird (to have been called B2 and to replace A2) disintegrated in a fiery accident at the time of launch. B2 was to have come 'on-line' this past March. A replacement for it, to be known as B2A, is scheduled for launch during 1994/5.

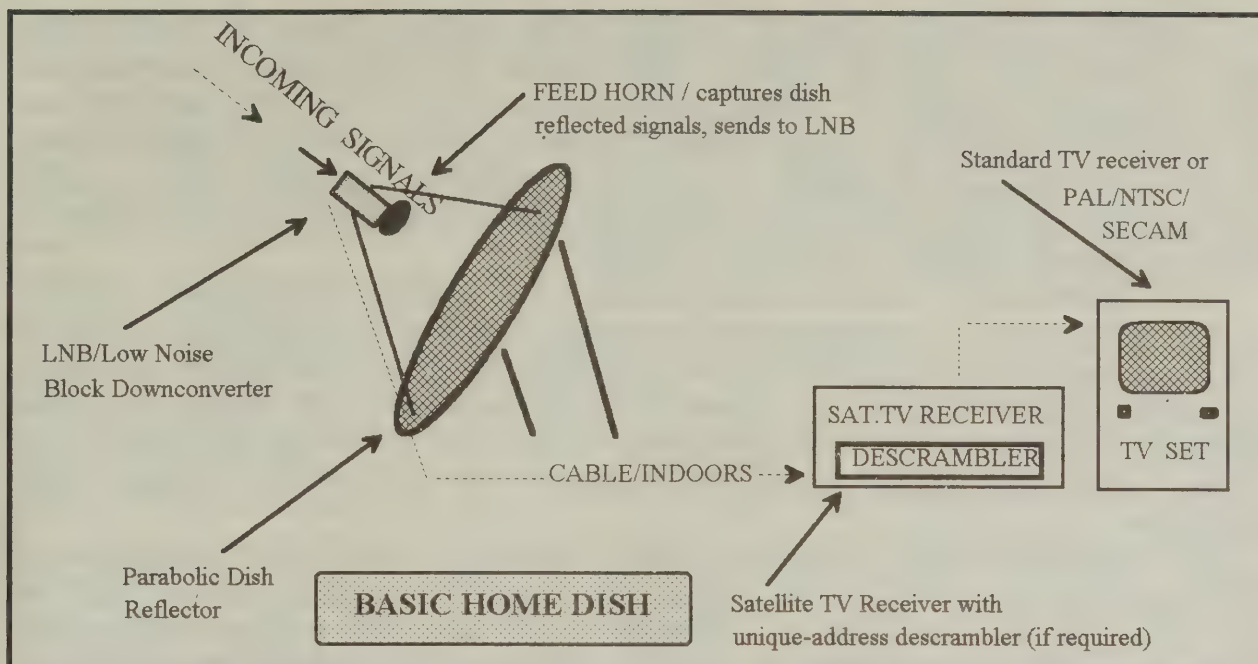
4) Pay television, via satellite, is at the moment limited in Australia by policy to delivery from either an Aussat or Optus satellite. A company that might attempt to bring into Australia pay television via say Intelsat (as is the practice in Europe) or the new PanAmSat would run directly into Australian law/rules prohibiting same. Today, satellite delivered pay television to the home has not begun in Australia.

This is a key factor in the future of satellite delivered pay television for New Zealand.

NUMBERS / AGAIN

If Australia's 16.5 million people are taken out of the Pacific Ocean Region 23 million population, this leaves fewer than 7 million potential users of non Aussat/Optus services. Of those approximately 7 million, half are in New Zealand.

European and North American satellite delivered pay (subscription) television services have found that a break-even point occurs very close to 1 million paying customer homes. The relevant word here is 'homes'. New Zealand's 3.5 million people are in 1.1 million homes. Starting a pay television service using established techniques and renting conventional transponder space would



require better than 90% of New Zealand homes 'signing up' for the service to break even. If the service also was marketed in Fiji (population 715,000), Western Samoa (165,000), New Caledonia (154,000), Vanuatu (149,000), Tonga (95,000) and American Samoa (37,000) the potential homes would grow to approximately 1.5 million and the 1,000,000 home 'break-even' point would represent 65% of the total homes in the entire marketing area.

Home penetrations (percentage signing up) in excess of 20% are at the moment quite unheard of in the satellite delivered pay TV business. Even cable pay-TV penetrations seldom exceed 50% and with cable television (unlike satellite TV) the customer makes no capital outlay for equipment; the wire simply comes into the house.

Using the European system as a model, Ku band home systems equipped with an appropriate addressable receiver (i.e., each subscribing home can be individually turned 'on' or 'off' to reflect their payment status) presently costs around NZ\$2,180 per home for a 1 metre size dish system. In Europe, dishes as small as .5m bring the price down but not more than 10%; the primary advantage to smaller dishes (which results from more powerful satellites) is aesthetic and mechanical. They are easier to install and less of a 'visual eyesore' when installed.

The American model, built around the 330 possible C-band channels available to a home dish owner, requires a dish no smaller than 2m and the cost is NZ\$3,640 on average. Both the European Ku and the American C comparisons are first-time capital costs only. To this the user must add a monthly subscription fee which varies by programming content. While some services in North America and Europe are totally advertiser supported (and free-to-air), others such as CNN are supported by a combination of advertising and subscription and still others such as HBO (movies, specials, sports) depend solely on subscriptions. Rates in NZ\$ are not likely to be lower than \$5 per month for a channel with advertising (such as CNN) or NZ\$20 for a channel without advertising. The home-dish average is likely to be not dissimilar to the \$13.33 per month per-channel now charged by SKY for its three channels.

There are two presently unpredictable elements here to keep in mind.

1) Whether at some future date the launching of pay television services in Australia might provide parallel service into New Zealand. If this happens, New Zealand will benefit from the economies of scale (Australia's 4.7 million potential subscriber homes) and service rates will come down per home while the total number of channels offered is likely to go up. Australia has recently set aside two transponders for (digital) pay television programming, scheduled to begin in March 1994. However, the two channels selected do not serve New Zealand and the services will not be available here at the time pay-TV launches in Australia.

2) The introduction of compressed digital video (CDV) transmission techniques. Until very recently, each satellite transponder (channel) was limited to carrying a single analogue programme service. As we described in CTD for August (CTD9308), the development of CDV technology now makes it practical to stack many separate TV programme services into a single transponder bandwidth. The net effect here is that a transponder costing NZ\$2,000,000 per year to rent can at the user's option carry (a) one analogue TV programme, or, (b) as many as 8 digital format programmes.

Thus, the service provider can now offer pay-TV subscribers 8 programme channels for the same transponder rent he was previously paying for a single TV programme channel. That's the good news. The bad news is that for a subscriber to take advantage of this new digital-based format requires purchase of a totally new design satellite receiver. In a region of the world where numerous old-fashioned analogue receivers are in use this could be a barrier to digital. In the POR, this is not the case since no previous pay-TV analogue format services exist so no home subscribers will be forced to throw away old fashioned analogue equipment in favour of new digital equipment to subscribe to the service (even if this were true, the dish and portion of the receiver outside - the LNB - would still be usable for digital reception).

The first high power digital format service (to offer as many as 150 TV channels into the home) launches in mid-94 in North America. The complete home receiving system (antenna, all electronics including the new digital format receiver and decoder), built by Thomson Electronics, has a suggested price-tag of US\$700 (NZ\$1,274). Thomson anticipates sales of 250,000 'units' during the first 12 months in North America rising to 2 million units by the end of 1996. These or very similar Ku-band reception packages could be imported into New Zealand (et al) and sold with no major modifications; and, used with either the new 701/703 Intelsat, the PanAmSat PAS-2 or the Optus (B series) satellites.

Australia, then, does not appear to have a near-term answer to the New Zealand desire for satellite delivered pay television. And while digital-programme-stacking may significantly reduce the costs per programme channel for pay-TV delivery into the home, there is at the moment no declared intent from any operator to do so here.

BEYOND 1994

The launch and commissioning of Intelsat 701 + 703, PAS-2 and Optus B2A brings into reach 64 C-band transponders on 7 satellites plus 43 Ku band transponders (15 of which are Australian). C band antennas down to 2 metres, Ku band antennas down to 0.9 metres will produce 'perfect pictures'. This compares favourably with the present 13 C-band and 10 Ku-band transponders 'available' on antennas 3-9 metres in size. To this point we have ignored a Rimsat satellite presently operating at 134 east with a channel of Tamil (language of northern Sri Lanka, southern India) television that is perfectly viewable in New Zealand on dishes 4 metres and greater. RIMSAT, leasing geostationary parking space from Tonga (see CTD August and September 1993), has announced an ambitious programme of new satellites over the next three years. If RIMSAT does everything they promise to do, on the schedule announced, there will be a minimum of 22 new

C-band transponders and 4 Ku-band transponders at 145 and 134 east by November of 1994. RIMSAT has itself leased satellites from the Russians and while the early satellites for RIMSAT are semi-geriatric Russian birds, over the next three years they plan to replace them with brand new, freshly launched Russian satellites. The Russian satellites tend to be simple in design but very robust; so much so that C-band antennas as small as 0.5 metres can produce perfect pictures when the satellite is factory new. RIMSAT, if it succeeds, could have a dramatic impact on the future of New Zealand television because in addition to the robust nature of Russian 'footprints' the transponder rental charges quoted by RIMSAT are but 1/5th of those for Intelsat (and approximately 40% of those for PanAmSat) (3).

Less of a 'maybe' than RIMSAT are 1995 launches scheduled for the next Indonesian Palapa (C1) version and the new Asiasat 2 C-band satellites. Palapa C1 is planning to place signal on at least 12 transponders over New Zealand (35 dBw forecast; 3 metre dish or smaller) from 113 east (second half of 95) while Asiasat 2 at 100.5 east also plans a 33 dBw footprint over at least the western 50% of North Island and virtually all of South Island on 24 transponders with an early 95 launch. The key ingredient here is that Palapa's existing customers include HBO/Asia, Discovery Channel, CNN, ESPN-Asia and ABC Australia while Asiasat's channels include BBC World Service Television, MTV Asia, Prime Sports, Star Plus and a Chinese channel. European SKY TV channels are likely to be added. Between Palapa C1 and Asiasat 2 New Zealand will gain access to not fewer than 10 and perhaps as many as 15 world-class satellite services. It is important to understand that these C-band services will require dishes in the 3 to 4 metre class with 1993 retail pricing in the NZ\$3,700 region for the complete system. This is nearly 300% more money than a 0.5m Ku-band system, following the North American format to be launched by Thomson Electronics in mid-94.

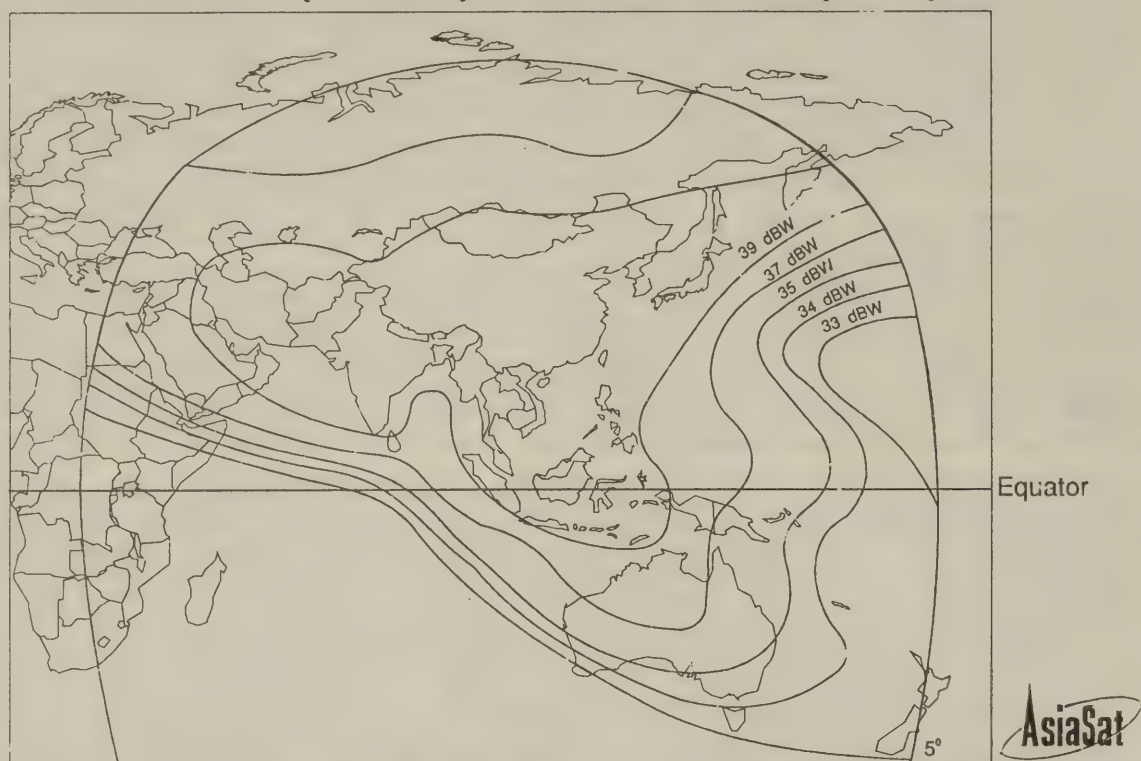
In an undercurrent flowing beneath all of these reasonably hard projected operational dates there are several whirlpools of discontent. The geostationary orbit 'belt' (that magic Clarke circle that circumnavigates the earth 35,881km above the equator) can accommodate only a finite number of satellites. It is practical for one satellite to carry C-band and Ku-band transponders on board one bird. It is also practical, within 'bumping limits', to place separate C or Ku band birds in approximately the same 'parking spot'. What is not practical is to place C-band birds within 2.5 degrees of each other along the 'parking arc' or Ku band birds closer than 2 degrees if the satellites are including all or some of the same ground (target) area(s) in their 'sights'. Closer than these numbers and receiving systems on the ground experience interference between satellites in their reception. Individual countries (not firms nor persons) can 'register' for these parking spots through a Switzerland based agency of the ITU known as IFRB; International Frequency Registration Board. PanAmSat's 'spot' at 169 east, for example, was registered by the United States and then allocated to PanAmSat.

Papua New Guinea, through an operating entity known as PacStar, would like to have its own satellites and requested 167.5 and 175 east for them to park. Yes, 167.5 for a PacStar and 169 for PAS-2 would be well under the minimum 2.5 degree orbital arc spacing required.

Tonga filed for 6 such parking spots, aided by a former Intelsat executive who saw a business opportunity for Tonga (the nation) to claim orbital positions. One of these spots is 134 east, where today Tonga authorised RIMSAT is operating a leased Russian satellite for TV broadcasting into India. Meanwhile a firm that purchased a retired Indonesian Palapa satellite has also filed a registration 'statement' for 134 east and has its satellite there waiting for customers to appear.

(3) RIMSAT, 1911 Production Rd., Indianapolis, Indiana 46808, USA; FAX 001-219-484-4547.

ASIASAT-2 (100.5°E) C-BAND EIRP (dBW)



ASIASAT 2 C-band satellite (first half 1995) will reach into parts of New Zealand with 5m size signals

Malaysia, South Korea, Japan and two privately owned United States firms plan C and Ku band satellites between 180 and 100 east during the next five years. Several of them conflict with satellites now in orbit, or planned.

PACKAGING/PRICING/BUSINESS OPPORTUNITIES

Nobody can forecast which satellite services will beam programming into New Zealand by a certain date on a specific satellite. Those decisions are made in the marketplace by people and firms concerned with the economics of their business and the potential profits.

At the present time New Zealand is at the bottom of a satellite system slump that began with the loss of AFRTS to scrambling and accelerated with the introduction of the Comsat Manoeuvre to our own (Intelsat) satellites. Aussat's first launch provided the hope that New Zealand would participate with Australia's Ku band services; that did not happen, largely because Australia has not been able to focus clearly on what it wants from a satellite system.

One of the larger system orders pending in New Zealand during the past 12 months is a \$75,000 package of equipment planned for installation at an educational centre. Home C-band dish systems here featuring 3.7 metre dishes, an inclined orbit tracking system, and a brand new 21" NTSC/PAL/SECAM television receiver (all three television formats are presently in use on Intelsat 508) sell for \$4,800 (+GST); add \$600 for installation (4). Considering only a few such systems sell here per month, this price is amazingly close to similar North American systems (within NZ\$1,200) at this time. CTD 9312 (issue date December 17) will complete this report.

(4) The lowest apparent priced home system we found in New Zealand, currently, is sold by Robin Colquhoun, 32 Valley Road, Mt. Eden, Auckland (3); (09) 630-7127.

TECHNOLOGY

BYTES

...BITS AND BYTES YOU MAY HAVE MISSED IN THE RUSH TO MAKE A BUCK...BITS AND

SATELLITE TV

Rupert Murdoch's London originated Sky News satellite delivered service will be available to home dish viewers and cable systems in Asia and North America in addition to present European availability. Murdoch's British Sky Broadcasting (BSkyB) expanded basic service package to 18 programming channels September 1 and now includes Movie Channel, UK Living, Sky Sports, Sky One, Nickelodeon (children's channel), MTV and Movie Channel. Shortly after BSkyB announced new service package within Europe, 65,000 homes reportedly sign up in single 24 hour period with per-month rates based upon number of services taken: NZ\$12 to \$60. Murdoch wants Sky News to be direct head-to-head competitor to CNN and plans coverage into Pacific at some unspecified future date. Sky Sports plans a second sporting channel in the first quarter of 1994 which will launch with coverage of England's cricket tour of the West Indies. Sky News began 13 hour service into South Africa via terrestrial broadcaster SABC early in October; an arrangement previously held exclusively with America's CNN. Official (Murdoch) News Corporation year end (30 June) financials note profits of NZ\$636m lead by major turn around from NZ\$68m loss for BSkyB in year end 30 June 1992 to NZ\$212m profit for year just ended. Murdoch is also planning issue of new class of stock shares to raise new capital for what he describes as "need to pursue strategic alliances in telecommunications with hardware and software companies." BSB projects NZ\$540 million profits for BSkyB in year ending 30 June 1994.

SKY's next round of profits may be significantly challenged by fast developing 'piracy threat' from European hackers. SKY, like New Zealand's UHF TV SKY service, bases its income stream on VideoCrypt encoding system. This 'smart card' approach to security has been badly compromised during 1993 with a prominent Irish based hacker's journal claiming Euro-piracy is now NZ\$900 million per year 'industry', nearly five times larger than Murdoch's net profits for most recent year. Piracy goes much further than attacking Murdoch SKY channels, having already broken down marketing systems initially created for D2-MAC/EuroCrypt, Discret (French) and VideoCipher encoding techniques. VideoCrypt uses plastic card containing by-subscriber addressable electronic authorization code. Pirate cards, 16mm longer than 'official' SKY card, sell for NZ\$300 quite openly even at London high street shoppes selling satellite TV systems. In past, pirate cards have forced SKY to issue new-series cards approximately twice per year. Latest version pirate-cards appear to be at least one step ahead of SKY anti-hacking protocols and simply delete 'subscription-turn-off' routine from data stream; i.e., once an individual receiving site is turned on, all additional commands to shut it down are piracy-card bypassed and unit continues to run even after being told to cease decoding. Under UK law, it is perfectly legal to 'hack' a TV channel as long as the channel originates outside of the UK. Origin's of present generation VideoCrypt piracy technology is reported to be 'central Europe'. Hacking publications show extent of 'international cooperation' between hackers worldwide listing more than dozen computer/modem Hacker Bulletin Boards (BBS) dedicated to the exchange of TV scrambling piracy information and software routines. August issue of German publication **TeleSatellit** included two-page 'product review' of alternate retrofit VideoCrypt decoder boards and replacement '8502 microprocessor smart chips' for VideoCrypt decoders further complicating 1994 profit scene for Murdoch's BSkyB. Programmers are responding with newer version smart card (Series 8 is being released now) and upgraded encryption algorithm. Australian postal authorities recently intercepted and detained Irish-published book (European Scrambling Systems: Volume 3) because it covers detailed description of proposed Australian national scrambling standard as already in use in European markets. Motion Picture Association of America (MPAA) lobbying European governments to adopt legislation making piracy an illegal act; presently only UK and France have laws on books and in October BSkyB obtained London court injunction stopping 'pirate card' manufacturer David Lyons and his Satellite Decoder Systems from importing, advertising for sale or selling 'pirate cards' in UK. Piracy of VideoCrypt (SKY) in New Zealand is not believed to be a serious problem.

Inevitability of satellite television delivered directly to homes was keynote of speech given by TVNZ Chief Executive Brent Harman during Auckland conference of the Asia-Pacific Broadcasting Union. "The window to the world via satellite television is now open and I think it will be impossible to close" he noted. "Information which in the past has been the prerogative of politically elite has become available to every person with access to a television set and a satellite dish." APBU delegates from Malaysia and Thailand spoke of national laws prohibiting private satellite TV systems (see China report here) but hoped world-class satellite broadcasters would police themselves by not offering programming objectionable to some cultures. A 'Code of Ethics' was proposed. Up to this point TVNZ's use of satellite television has been restricted to receiving inward bound feeds for news and sports via Intelsat and Optus, nightly transmission of the 6 PM news to the Chathams via Intelsat, and a cooperative business venture based in Singapore creating an Asian satellite business channel (which began service 01 November).

TAMIL language television, operating under name of SUN TV, is now functional from contested Tonga 134 east position where operator Rimsat has secondhand Gorizont (17) satellite parked. Indonesia has protested Tonga's use of this space slot (see **CTD** August and September 1993). SUN TV is on 3675 and 3776 MHz and high quality pictures are possible in New Zealand on dishes 4m in size and up as well as over all of Australia. Satellite operator Rimsat is beaming programmes for India which operate 3 hours nightly (6-9PM Madras time) and has three additional TV channels available for lease at 134 east. SUN TV programmes carry commercials, are uplinked from Russia. Gorizont satellite is in 'inclined orbit' and must be tracked by dish over nightly 3 hour operating period.

Australian satellite operator Optus is reported in '**International Communications Magazine**' to possess a previously undisclosed capability; a 'footprint' (coverage zone) that extends into the central-south Pacific beyond the published Australia/(New Zealand) known coverage. Having such a 'secret footprint' might allow Optus to be competitive with other Pacific Ocean Region (POR) satellite operators such as PanAmSat or Palapa. PanAmSat has made no secret that it covets providing television and other services into Australia although to date the Australia government has resisted any overtures from PanAmSat. In the pay-TV-via satellite area, Optus is reported to be reserving transponders 10 and 11 (horizontal) on satellite B1 for a scheduled March 1994 'launch' of Australia's first pay-TV service. Each of the transponders will be used to carry four digitally compressed TV channels. Transponders 10 and 11 are not among the B1 channels which have New Zealand coverage capability.

INTELSAT 701, first of brand new C + Ku band satellites, had successful launch 21 October and should be 'on station' at 174 east by 20 November. Satellite will begin operational testing shortly, could be in regular service as soon as 1 January (see feature report this issue).

CHINA without advance warning has announced regulations banning virtually all private ownership of satellite dishes except under conditions of government 'approval'. During past 12 months China has been fastest growing 'home-satellite-dish' market in the world fueled by AsiaSat and other services beaming upwards of 40 TV programme channels into southern and central China. Russian satellites have been available for nearly two decades in far northern areas but programming had never been attractive. Now, Russian satellites are leasing channel space to MTV-like programmers and they too are now on the banned list. Satellite dishes had spawned extensive cable TV industry in China as well; entrepreneurs were installing dishes, importing American and European cable TV hardware to wire up entire communities. The Chinese government knows where these systems are located; it is not so certain it knows where individual, often well hidden, private dishes are located. The government decided BBC and CNN news coverage, MTV music programming coming into China was promoting spread of 'corruptive western influences'. Qatar recently enacted similar regulations; India is struggling with rapid growth of satellite and cable TV services as well.

American NBC network has purchased 75% of European Super Channel satellite service which claims a reach to 56 million Europeans through cable TV systems and direct to home (DTH) satellite. NBC plans to develop joint programming ventures for channel with European broadcasters, is adding several NBC long running news and entertainment programmes (Nightly News, Today and Tonight Show) to lineup shortly.

PanAmSat, operator of new C plus Ku band satellite to be operational for Pacific Ocean Region (POR) by mid-94, (see primary report this issue **CTD**) is routinely transmitting compressed digital video (CDV) on feeds to South American cable television and wireless cable systems. Up to 500 receiving sites will test the new CDV loaded transponder with six separate programme channels compressed into single C band satellite transponder width. Receivers in use are General Instrument DigiCipher 1000.

Australian-American corporation SatelLynx claims it has an agreement with Intelsat to utilise aging (inclined orbit) C band bird at 177 west for delivery of 'pay and direct to home (DTH)' TV programming into Pacific sometime during 1994. SatelLynx has demonstrated compressed digital video (CDV) system they claim is proprietary at US

trade shows recently and also claims it has worked out arrangements with American (cable) programming suppliers for 'software'. Firm says it will provide (sell, lease or rent) special digital receivers for service. Major roadblock to others with similar plans in past has been reluctance of Australian authorities to allow 'landing' of hardware (receivers) in their country for any pay TV service that is not Australian owned and operated.

HBO Asia admits it is likely to be another 3 years before the Singapore based service is profitable. The transplanted American service is in direct competition with now-Murdoch controlled STAR TV, although the two relay through separate satellites and viewers require two dishes to place the two services head to head, or a motorized dish to switch from one to the other. HBO is targeting Hong Kong, Philippines and Taiwan at the present time and shows all movies in English. Chinese and Thai language subtitles will be added with cable and SMATV firms as primary customers. Competitor STAR's movie service is expanding by adding Hindi and Chinese language movie channels. Censorship sensitivity has been an ongoing problem for US made films shown by HBO in Asia, especially in Singapore where the government operated 'cable' (MDS 'microwave') service routinely requests movie editing changes or total movie replacements in the case of films such as 'Goodfellas'.

Another satellite delivered 24 hour per day television news service is being promoted by British ITV broadcaster Carlton TV. They plan a 'cable' news channel for Asia and would compete with the expanding BBC and CNN services in the same region.

NTL/National Transcommunications Ltd. (UK) and Eutelsat (Europe) have completed tests showing ability of single satellite transponder to simultaneously carry analogue (FM) TV and digitally compressed video (CDV). One analogue channel was combined with four CDV programmes in test using NTL's System 2000 protocol. The digital rates were 8Mbits/second (broadcast quality).

CHINA Central TV now available throughout North America via satellite 12 hours per day. American Asian Satellite TV Network utilising cable and home TVROs to reach Chinese speaking residents of North America. Several European national TV services, including Spain, Italy and Turkey, use satellite in similar fashion to transmit 'home' programming to nationals living out of country.

BBC World Service Television is testing digital compression technology using an Intelsat satellite at 53 west (not visible in NZ) for crossing of the Atlantic. Customer for service is Canadian Broadcasting Corp. (CBC) and BBC World Service has announced plans to utilise same format to extend service to Asia (Japan), Central and North America in coming year. CBC is direct customer for 2 video and 4 audio channels on digital feed. Service provider IDB also operates Pacific region service transponder on 180 east satellite feeding (amongst others) near-daily Donahue and Oprah programmes to customers in NZ and Australia. IDB first 'tested' digital compression on this Pacific circuit more than one year ago.

Intelsat is being asked to provide 'temporary excess-transponder capacity' for planned worldwide coverage of South African national elections this coming April. Intelsat has new (702) series bird scheduled for February launch, but says it needs until May to complete operational checks. World news organizations say they need the capacity in April and have suggested that unused Russian satellite might be placed in temporary position to provide satellite circuits out of South Africa for the election period.

French cultural ministry calling for massive opposition to latest pair of new satellite TV channel services to appear in Europe. Turner's Cartoon Network (in USA and South America, 24 hour per day cartoons) and TNT (Turner Network Television; mixture of sports, movies, specials) launched via European Astra satellite September 17 having secured channel space and authorization through UK's ITC. Presently TNT has 10 hours per day, Cartoon Network 14 hours on the shared channel. The European Commission attempts to manage a 1989 (EC) agreement that established guidelines for cross-border satellite broadcasting. One of their directives mandated that any new TV programming via satellite in Europe consist of at least 50% European-produced content. The satellite service with which TNT/Cartoon are affiliated claims 15.6 million European homes in 16 countries via direct to home (DTH) and cable distribution. French activists representing the film and video industries are urging their government to "sacrifice the entire Gatt treaty", if necessary, to settle this dispute. Turner's response was they would abide by whatever decision EC Commissioner Joao de Deus Pinheiro reaches. French government filing formal complaint with European Commission.

British Telecom, scheduled to begin selling home satellite receiving system packages by end of year at retail shoppes all over UK, has selected at least one of its suppliers. Cambridge Industries is packaging dishes plus electronics into BT Telecom systems 'custom designed' by firm using current ASIC design technology.

DirecTv, 150 channel capacity digital compressed direct to home service scheduled for mid-94 North America launch has begun to sign up firms to distribute the service on the ground. Earth station package, to retail for around NZ\$1,200, is being manufactured for DirecTv by Thomson Electronics. In western Texas, a consortium made up of

local telephone companies and local power companies have signed agreement to act as distributors for hardware and sign-up viewers. Actual retail points will be electronic and appliance stores, satellite equipment outlets.

European satellite viewers will benefit from 'power war' now ongoing between rival Eutelsat and Astra satellites. Next generation Ku band satellites are vying for 'most power in sky' with new bird names like 'Hot Bird' and 'Super Bird Plus' battling in European press to prepare consumers for high quality reception using dishes down to 400mm in size. New satellites come on line in early 1995 through 1996.

Japanese government's recent decision to allow Japanese companies to link into and out of Japan using satellites owned by parties other than Intelsat may become a major step towards allowing Japan to enter programme distribution business. Until now, Japan's insistence that all satellite links utilise Intelsat has kept lid on Japanese entrepreneurs who would like to package and provide TV and other communication services in Pacific. Kokusai Denshin Denwa (KDD) has announced it will lease transponder space on a non-specified (Russian) Intersputnik satellite for TV transmissions to neighbouring Pacific Rim nations.

DIGITAL TV

New Zealand television viewers are seeing their first regular use of digitally compressed video sent through a telephone network as the Whitbread race unfolds. Using a 64Kbits/s satellite service normally reserved for phone/fax/data transmission, the same small dish technology that allowed Kiwis to follow CNN's Peter Arnett through the damaging bombing raids during the Gulf War will transmit colour images of the race in progress from the decks of Endeavour and Yamaha. Of 16 yachts, 10 have been equipped with video camera, store and forward British Telecom 'video codec' unit that creates moderate quality moving colour images and a satellite transceiver. The incoming images are routed from satellite to a London TV studio where decoding takes place. Two Auckland companies, Terabyte Graphics and Procreation, put together the service which will over the nine month race market the images to newspapers and other customers. A video CD is also planned as a chronological 'log' of the full race.

AMERICAN PERSPECTIVE: "Europe Lags As High Tech Power"

Writing for the Los Angeles Times Syndicate, columnist *Michael Schrage* represents a view increasingly heard in American and Japanese high-technology circles. He reports:

"Germany's digital best-sellers today are Japanese hardware and American software. Want to install an ISDN telecommunications switch for your global branch here? You may have to wait six months. Want to lease a high-speed pan-European telecom link? It will cost you more than five times what it costs to acquire comparable capacity in America. There's even some uncertainty whether its technically legal to plug a U.S.-made laptop into the telephone lines without Bunde-post approval. Germany lags well behind France and England in quantity and quality of computer networks.

"Fly an hour to London and you will find the computer shops stuffed with the Japanese-American combination - but the UK does have a thriving, domestic, software development industry. However - the telecommunications infrastructure is still far inferior to what exists in America. For example, features such as call forwarding and call waiting have yet to be seriously marketed.

"Europe has come to the painful realization that it has failed to hold its own as a developer and distributor of value-added technologies. Where European community-wide industrial policies and the economies of scale offered by a single market were supposed to ensure Europe's technological competence, virtually every EC high-technology initiative ... has been an unambiguous failure.

"Initially, telecommunications was one of only two industries exempted from the EC's push for a single European market. A special Green Paper issued this past June now calls for a 'harmonization' of telecommunication practices and protocols. The new European reality is that European technology policy as an engine of growth is effectively dead. Indeed, European technologists are now more concerned with survival than competitiveness.

"While technological innovation was once seen as a medium of economic growth and renewal for an integrated Europe, it's now being treated as yet another symptom of the continent's inability to compete."

Note: A poll conducted by **Harris Research**, using 500 senior European executives as a study base, found 60.5% of all those polled ranked the liberalization of telecommunications in Europe as the number one impediment to European growth. Telecommunications ranked ahead of railways, health care, electricity and airlines in the study conducted across Europe in September.

Thomson-CSF may change the world of compressed digital video VCR recording before it even begins. Firm has announced a revolutionary new technique for recording CDV signals on metal-evaporated Hi-8 tape. As demonstrated, nine separate digitally compressed video programmes were laid down on Hi-8 tape using parallel 18 micron width tracks. The technique uses a static rather than revolving recording/playback head with a tape speed of 2.6cm/second. The tape's capacity is 20 Mbits/second with 12 Mbits/second presently available for video signals. The system uses a variation of magnetic recording and a magneto-optical playback with a 50mW laser, CCD sensing chip and Kerr (design) transducer. Thomson-CSF believes that as the laser definition of the technique improves, up to 1,000 (!) separate digital TV signals could be laid down side by side on the Hi-8 width tape or an equivalent. The working system is in prototype form at present with some years of additional development time likely. With the parallel-track technology, the system would appear to be a marriage between CD-I technology and VCR technology with advantages from both including rapid data search and retrieval of the CD-I format.

Real time compression of digital video without use of computer as tool has been demonstrated by California firm CQ Microsystems. Newly developed chip-set allows instantaneous video-in, compressed video out and compressed in, video-out.

SANYO and SGS-Thomson have completed development of 4 LSI chips to be used in CD-I full motion video (FMV) devices using MPEG standards. First chipset delivery to manufacturers of CD-I, karaoke CD and TV game machines will be in first quarter of 1994.

SONY will begin shipping 'sample 2-chip sets' of MPEG decoder chips in March at small quantity pricing of \$139. Commercial availability of the chips in quantity has not been announced.

Format decision for European digital broadcasting not yet firmed-up. Four serious contenders for SDTV (standard definition TV) and one for high definition (HDTV) continue to make improvements and software changes as over the air testing continues at frenzied pace. The Working Group for Digital Television Broadcasting (WGDTB), made up of cross-industry people from 8 European countries, hopes for a common standard applicable to terrestrial, cable and satellite broadcasting. They would like hierarchical coding for progressive steps of transmission complexity. France's TDF has system it calls Sterne which they have demonstrated carrying two HDTV programmes or four SDTV programmes in single 8 MHz 'channel'. Thomson CSF and the BBC has field tested a 64Mbits/s system that uses simultaneous vertical and horizontal polarisation to double the capacity of a 8 MHz 'channel'. It has been demonstrated carrying one HDTV plus 4 SDTV programmes simultaneously. National Transcommunications (NTL) is field testing a variable bit rate system sending digital signals at 2, 4 or 8 Mbits/s using single-channel-per-carrier or multiple-channel-per-carrier technology. Most of these systems are slightly modified variations of the basic MPEG-2 'world standard' and most claim they could be MPEG-2 compatible with fine tuning.

American Advanced TV Advisory Committee has given preliminary approval to MPEG-2 compression system for HDTV in North America. Approval includes selection of Dolby AC-3 for HDTV audio system and backs compromise that would allow use of any of five different progressive scanning speeds/line counts, or, 1080 line interlaced scanning. Europeans had earlier delayed their own decision hoping that after American decision Europe could adjust to create true world standard. There could still be problems; MPEG people favour Philips Musicam audio system. Musicam failed first series of tests but cause of failure has since been corrected and reconsideration of audio 'standard' is possible. A February decision on last remaining 'block' in digital system, transmission standard, is expected. Three remaining candidates are 4-VSB, 6-VSB and 32-QAM modulation techniques. With American decisions, hardware prototypes can proceed.

Panasonic Euro 1 entry to hybrid digital and analogue TV chassis market continues to receive high-grade marks from TV service people in Europe as they are adjusting to digital 'trouble paths' and learning to cope with non analogue like "Now it's there, now it's gone..." trait of digital. When data streams are interrupted, or polluted with erroneous 'bits' analogue-experienced service personnel find new categories of symptoms. Examples from Euro-1 chassis: Composite video or separate S-VHS luminance and chroma signals enter the SAD chip (IC1601). For analogue to digital conversion to function correctly in the SAD chip the video input signal must be clamped within a 2 volt window (5V to 7V at pin 13). 5V line-frequency clamp pulses are simultaneously fed to pin 35. If the clamping pulses are not present the video dc. level increases producing a grey or white picture. Missing video data signals cause first-time-interesting pictures. Loss of the least significant bit (V1, SAD pin 33) causes a slight resolution loss. However, loss of the most significant bit (pin 40,V7) causes the entire picture to go as the sync pulses disappear. As digital chassis come into New Zealand in numbers, a new chapter in service personnel training is approaching.

CONSUMER ELECTRONICS

Sony Handicam Vision (European name; 'SNAP' in USA) is latest entry in increasingly competitive and feature-oriented camcorder market. When Sharp introduced 'Viewcam' line that marries 8mm camcorder to LCD display, product took off with considerable consumer enthusiasm. Package allows instant review of what user shoots as well as portable player for tape playing. Size and weight are all important: Sony Handy Cam Vision weighs under .6kg, 40% less than competitive Sharp unit. Unit has book-shaped vertical form with 2 position (wide or 2X) lens at top, 1/4" 320,000 pixel pickup, 3" 76,000 pixel LCD (colour) screen with built-in microphone and speaker. LCD is at rear, covered with pull-up sun shield. Under European model designation CCD-SC5 it has recommended retail of NZ\$2200. Sharp standard 8 with 4" screen has recommended price of NZ\$4500; a significant differential. Sony promises Hi8 version will follow; Sharp already has Hi8 at NZ\$5400. Nikon recently began selling, under license, Sharp high-end Viewcam unit at NZ\$3800 but only in Japan; production limited to 2,000 per month presently.

News Datacom, Rupert Murdoch owned information retrieval business, has signed contract with Britain's Comstream to create home delivered digital worldwide network for news and data accessing. Murdoch has also purchased Delphi Internet Services to speed up what he terms "the creation of the world's first electronic newspaper."

AMERICAN PERSPECTIVE: *Breaking Japan's 'Kaizen' Mold*

Writing for the Associated Press, technologist *David Thurber* reflects on the slow-down in Japanese industrial output and that country's first recession period since before the Korean War.

" 'Something strange is happening in Japanese high technology' observes Makoto Saito, deputy director general for technology affairs at Japan's trade ministry. ' Until recently (Japanese) people saw a bright future for our country based on technology. But recently ... development of new products, which have supported Japan's industrial system, is slowing and the pace of development of advanced technology is also slowing.'

"Japan's attempts to pioneer new technologies have not dazzled. Projects in magnetically levitated trains, nuclear and super conducting ships, advanced rockets and high definition TV have been plagued by unexpected snags. In the 1960s and '70s government sponsored research projects were used to boost the technological level of all major companies in given industries. Research was carefully focused on areas thought important for future business success - and the research was shared by all participants. Now, individual Japanese corporate research facilities are first-rate and companies are reluctant to join government research projects where they must share technology with competitors.

(Unfortunately) "there's a standard Japanese risk-aversion, especially with high technology. They hold back a bit on leading edge technology and wait to see where markets emerge, and then jump in.

" 'For many years we had a nice teacher (the United States) and all we had to do was follow' observes Joseph Nishimura, general manager of Sanyo's high definition TV development center. 'Japanese companies hesitate to move into uncharted waters, continuing to do what they have done in the past - honing new technologies often developed abroad and finding inexpensive applications in consumer products'.

"This Japanese specialty of '**kaizen**', or relentless improvement of existing products, is inappropriate for moving into the (world) technological lead. Hiroyuki Mizuno, executive vice president for research and development at Matsushita Electric Industrial, asks 'Why has Matsushita, an uninteresting company, been able to do so well? Because we can do anything, but we are never the first to plunge in'.

"Masataka Shimada, a professor at Keio University, says Japanese companies failed to take over the technological lead during boom years in the 1980s by not pursuing original research. ' When someone in a company proposes research in a new area his boss asks *Are our competitors doing it?* and if the answer is no, he then asks *Are you willing to take personal responsibility?*

"Wilf Corrigan, chairman of LSI Logic, an American semiconductor maker with a Japanese joint venture, believes Japanese companies will recognize that they need painful adjustments to become more agile and responsive. ' It is going to mean major, major cultural changes. What you are looking at in Japan is a structure dominated by the equivalent of 20 IBMs - and all less flexible than IBM".

Sexually explicit E-mail bulletin boards, largely based in Denmark, have become target of increased US legal prosecution efforts by Department of Justice. The transportation into the USA of child pornography images from European bulletin boards is attracting much media attention and special 300 investigator task force dubbed 'Operation Long Arm' has nabbed more than 50 US citizens to date for 'knowingly importing child pornography'. Bamse BBS in Aalborg, Denmark has been implicated in several cases. US trade magazine Boardwatch in September issue reported that of 100 most popular computer bulletin boards, 12 feature explicit sex material including 3 in the ten top.

BERLIN IFA trade show drew 446,000 people in ten day run although 9 month European consumer electronic sales are markedly down (TVs down 9%, VCRs off 15% and camcorders dropping 15% from 1992). Show is usually forum for introduction of 'products of the future' and one attracting attention was a controversial Laser TV system from Schneider. System uses almost invisible ceiling hung 'mesh' rear projection screen in sizes from 40 to 200" illuminated by 3 coloured laser beams. Product is scheduled for market in 1996 but many technical observers labeled demonstration 'interesting science project but not a viable commercial concept'. Other products getting attention: 'Dolby' surround sound for TV broadcasts (new to Europe) and widescreen TV receivers where 30 inch (32W by European measurement) was attracting interest.

PERSPECTIVE: *Implications Of Japan's Economic Downturn*

A slow trickle of announcements indicating a slowdown in the Japanese electronic industry has turned into a torrent during the past 60 days. Major Japanese electronic names are downsizing their projections for current year sales, earnings and right behind those announcements many are announcing corporate plans to downsize facilities and employment levels.

Matsushita generates more sales per year in consumer electronics than any other firm, anticipating current fiscal year sales of NZ\$115,000,000,000. That's down 7% (\$8,000,000,000) from last fiscal year. They expect pretax profits to be down 11% and net income to rise 4% (against an earlier predicted 46% rise).

Economists see two factors pushing down Japanese electronic firm sales and profits; the strengthening of the Japanese yen (averaging 105 yen to the US \$ during October), and, a persistent downturn in the economy of key Japanese export regions. Europe in particular has been a disappointment to Japan's exporters where unemployment on 1 January stood at 14.6 million in the EC but rose to 22 million by the end of July. There is also a third factor; Japan has lost the high volume, low and middle priced electronic markets. Japanese firms have moved with increasing speed to develop partially or co-owned factories in nearby Asian countries (Thailand, Singapore, Indonesia, Malaysia and currently mainland China with Vietnam now developing as supplier). Products that were at one time built with Japanese labour and sold for yen are now being assembled by lower cost non-Japanese labor and at least within import circles being paid for in currencies intermediary to the yen. Japanese built TV sets dominated the world market as recently as 5 years ago. In July of this year, Japan imported a record 333,317 TV sets into country while exporting only 252,025. Only in Camcorders does Japanese volume presently dominate the (world) export market.

Virtually every Japanese 'name brand' firm is reporting disappointing results similar to Matsushita. Sony sales are down 10.4% and earnings down 35.8%. Pioneer sales down 13.8% and profits down 74.2%. JVC sees sales off 9% and a 21.7% profit loss. And the list goes on.

Japanese firms do not view this as a 'short-term' problem. JVC expects to lose NZ\$533,000,000 this year and is closing its Tokyo headquarters, moving to Yokohama. Matsushita will cut capital investments 17%. Sony glumly forecasts "difficult business conditions for the next 9-12 months". Toshiba is reorganizing into four consolidated business groups. Hitachi, after two years of watching their German VCR plant run in the red closed the doors. Pioneer will cut costs by shifting more of its production to lower-cost Asian points.

China is increasingly becoming a source for low and middle-priced consumer electronics. As one example, Chinese two head VCRs, carrying Funai/Symphonic/OEM brand names, began shipping in quantity in May. Announced; 300,000 per month by April coming. Samsung will open a VCR plant there by mid-94. At the moment only 10% of the raw parts going into these VCRs are Chinese made; by mid-94 goal is 70% Chinese content. By 1997 the industry expects Japan to be a 'net importer', not exporter of consumer electronics. The Japanese OEMs are clearly concerned about their future.

Texas Instruments has shown unique high definition colour TV projection system for which technical observers are giving 'breakthrough' ratings. 'Digital Imaging System' (DIS) is part electronic, part mechanical. A micromechanical silicon chip measuring less than 16mm on a side contains 300,000 'tiny' movable aluminium mirrors. The micro mirrors, each a 17 micron square, are driven by electronic logic memory. The mirrors rotate from reflective to not reflective in 1/256ths of a single (NTSC) frame. With such a density of mirrors, a 'pixel' becomes far smaller (each mirror is a pixel) than with conventional CRTs. The combination of very fast 'on/off' time coupled with more pixels per square unit of display results in resolution several orders of magnitude better than conventional display systems. The colour display has a xenon arc bulb to direct white light through a condenser lens, then through a rotating motor driven wheel with red/blue/green filters; and then to the surface of the digital mirror device (DMD) chip. The chip replaces conventional mirrors and projects through a 'zoom' lens onto screen. TI believes a 60" projection display screen will be built in a cabinet only 460mm deep.

SHARP claims to have solved one of the nagging problems with LCD displays using thin film transistor (TFT) active matrix displays. Newly demonstrated system allows viewing at angles of up to 80 degrees (conventional LCD's are difficult to view at angles over 35 degrees). Firm believes with this break through LCD screens to 20 or 25" are now possible, may introduce a large screen consumer model during 1994. A 14 inch system was shown.

SANYO, Japan's NHK (national network) and a Japanese printing company have developed a projection TV system which they claim creates 3-dimensional images without need for viewer glasses. System features LCD projector equipped with lenticular (biconvex or lentil-shaped) lens. Separate left and right visual images are projected onto companion lenticular screen. Two models will be available by August; 40" at NZ\$103,700 (not a typographic error) and 70" at NZ\$156,000; modest prices indeed to replicate Paul Holmes' face in 5X life size and true 3-D in your very own living room.

Taiwan, not a major player in TV receiver market worldwide, hopes to capture significant share of rapidly expanding big-screen projection TV market. CMC Magnetics Corp. (Taiwan) has taken out licensing agreement with US inventor of unique LCD projection system using 'depixelization technology'; Projectavision Inc. CMC says they will market under their 'MGM Home Theatre' brand inexpensive big screen TVs. Projection sales in US are up 32% from year ago. New Zealand Statistics keep track of screen sizes, does not break down display method nor quantify sets with receivers above 560mm diagonal measurement (see STATUS, this issue).

MiniDisc (MD) vs. DCC (Digital Compact Cassette) contest to achieve acceptance as 'next audio technology' looking less good for DCC. At Berlin IFA, Sony's MD clearly had momentum with major new backer (Volkswagen), new prerecorded titles (more than 800 claimed worldwide), new sales records (300,000 units shipped through 01 September) and new projections for rapid growth (Sony projects 10 million players worldwide by end of 1995). There are now 7 MD pressing facilities in world (6 in Japan) with 3 million MDs produced in first 3-quarters of 1993. Industry figures show MD has grown this year at twice rate of audio CDs during its first year. Sony has wide range of new MD models to be available worldwide by March including car player (NZ\$1365) and minisystem (NZ\$2400). DCC, backed by Philips, is fighting system cost constraints. Presently DCC decks cost several times analogue counterparts and with sales lagging, Philips suggests it may be two years "or more" before DCC brings costs down to analogue comparable. In effort to boost sales, consumers in Europe are being promoted to trade-in analogue tape decks this month in return for 'substantial savings'. In USA, buyers of DCC130 portable and DCC900 home decks are being 'bonused' with Polygram label tapes valued at NZ\$250. Masushita has announced pair of DCC decks with component DCC minicomponent system. Under Technics label, RS-DS8 at NZ\$1710 replaces earlier Panasonic RS-DC10 (NZ\$2320) with double-fast search speed. A mini-component recorder (RS-DCM1) at NZ\$1210 available in December will be augmented with Panasonic full feature system at NZ\$2550. Matsushita projects 1.3M DCC unit sales in 1994; will introduce models in Europe and North America by March.

Audio CD-R ('R' for recordable), a professional level technology, may be heading into consumer hands and the music copyright folks are reacting with anger. Kenwood, Nippon Marantz, Yamaha and Pioneer have announced CD-R equipment will be available in their 'top-of-line' (translation: pricey) consumer product areas by end of first quarter 1994. Like forthcoming digital TV VCRs, unless steps are taken to prevent practice, unlimited dupes can be made without sacrifices in (audio) quality. In a 1989 accord, audio manufacturers agreed not to offer CD-R technology to consumers without first consulting the world's recording companies. However, the four Japanese firms apparently decided to release new CD-R gear without meeting with the music folks. There is a 'Serial Copy Management System' (SCMS) combo soft and hardware 'block' built into CD-R gear now sold for professional users; same system would be in consumer gear to be sold. How pricey? NZ\$8,500 for CD-R unit and \$54 for each blank CD-R disc thereby insuring users have no financial incentive to duplicate and mass market 'bootleg' discs.

SONY is now shipping what they claim is the world's smallest DAT player; model WMD-DT1. The size of a conventional (audio) Walkman, a pair of AA batteries will run the package for four hours with a suggested retail price of NZ\$750.

Masushita began selling new ultra-compact 'mini-component' VCR in Japan November 1st. Unit is 1/3rd smaller than traditional units measuring 31cm by 24.1cm by 7cm. Called 'Mideo' (for miniature video), design has totally new 'flat real' deck mechanism and miniaturized capstan motor as well as 'high density' packing of ICs. Production will initially be 20,00 per month with probable New Zealand price near \$1500.

JVC has announced specifications for interim W-VHS (widescreen VHS) recording and playback systems. Hitachi, Matsushita, Mitsubishi and Sharp are said to have been consulted on the standard which will allow for recording/playback of widescreen HDTV, or simultaneous recording and playback of two separate NTSC programmes on the same tape. System begins with conventional VHS, adds Hi-Vision heads but maintains same tape and drum rotation speeds as standard VHS. Metal heads and high performance metal powder tape (with tape thickness equivalent to present T180 type) would allow 3 hour recording in HDTV or SD-2 (2 channel standard NTSC); 6 hours in standard NTSC. Early NTSC models are likely to be priced in NZ\$10,000 range but PAL compatible formats not yet formally announced. JVC will produce models for Matsushita as well with scheduled March-April debut in Japan.

High-price-end consumer 'A-V Entertainment Centres' is latest marketing concept in fast paced US consumer electronics market. Major brand-name furniture manufacturers (Thomasville, American Drew, Pa. House, Lane and others) are teaming with one or more audio-visual OEMs to package near-custom designed furniture pieces specifically tailored to suit multiple-component pieces of typical home A-V centre. Mitsubishi, RCA, Philips and Sony have entered contracts to distribute component audio and video units in packages through furniture outlets after furniture manufacturers began designing customized wood based products for them. Philips/Thomasville combination holds special training schools to educate sales people in furniture outlets on finer points of combination electronic-furniture packages. Customised pieces range from NZ\$3,600 to more than \$21,600 in 'off-the-floor' designs. In related field, Paramount Pictures licensee Home Theater Products is marketing audio, audio-video packages directly to home builders to be included in home packages by builder. Extensive one-piece in-wall audio system with CD player, tape deck, AM/FM tuner, 50 watt amplifier and wall-installed speakers is selling to builders in NZ\$2700 range. Video systems include 46-60" rear projection systems that are built-into walls as part of initial house design.

Custom electronic system design and installation, a recent growth business in US, is reaping sizeable rewards with growth fueled by consumer-confusing array of audio-video systems. At recent mini-industry convention hundreds of installing dealers saw display booths from 90 hardware supply firms and agreed residential business is up while commercial business is down. One major industry problem; working out what is and is not included in self-definition. From original burglar/fire/police alert packages and wood cabinet dominated home A-V centres of four years ago, industry has grown into sophisticated 'interfacing realm' where elaborate copper wire, fibre optic and infrared systems interconnect stand alone home units into single computer controlled 'network'. Emphasis is now on controller/interface devices that tie entire house/building into single management system. Amongst products displayed was AMX's new AxCent controller for home automation offering 6 input/output ports for relays, 4 RS-232 computer interface ports capable of controlling 'intelligent' heating/ventilation/air conditioning/security plus lighting systems and 8 infrared ports for AV equipment. Package price was around NZ\$3,000.

Sharp's latest LCD projection TV system boasts 560 lines horizontal resolution with 25-200" (diagonal) measurement displays. System has more than 900,000 pixels with switchable 4:3/16:9/21:9 aspect ratios, 100:1 contrast ratio including fuzzy logic brightness circuit and range of input standards. Weight is 15Kg and system has debuted in US market with NZ\$20,700 price tag.

Sony has begun selling its first widescreen TV sets but only in Japan. Four models, 2 are 28" (NZ\$4100-5800) and two 32" (NZ\$5800-\$7400). Firm has also released technical details on high resolution small screen LCD displays targeting projection TV and camcorder viewfinder market; 400 lines horizontal resolution with 180,000 pixels in an 18mm display and 260 lines with 113,000 pixels in 14mm display.

THOMSON Consumer Electronics, 4th largest consumer electronics manufacturer in world with 20% of 1993 US market, wants to further expand global operations and is developing business plan for software. New Asian headquarters building in Singapore is under construction. In Europe, new 23/27/35" "Superflat" picture tubes are being delivered with Invar masks plus dark glass and optional antireflection coatings.

GERMAN firms have begun to design consumer electronics to accommodate recycling of circuit boards and cabinets. BASF has also developed recycling equipment for audio and video cassettes and newest BASF tapes on sale proclaim "This tape 100% recyclable".

TV Allowance is US name for device bearing Magnavox name and marketed by Philips. Unit has multiple-identification 'password' entry 'time clocks' so that TV set can be programmed for maximum amount of viewing time 'allocated' to each 'password holder'. Concept is parents can control TV viewing (no viewing, viewing limited to certain times of day, or viewing limited to maximum accumulated time per day or week) of children by programming unit 'master clock'. Each user enters own 'password' and this starts TV set with countdown timer turning set off when time has expired. Suggested retail will be NZ\$180.

TV 'violence chips' are being suggested as key to curtailing children viewing of programmes laced with violence. US TV broadcasters are being blamed for parallel increases in street violence and appearance of more violent TV programming. One suggestion; all TV sets be equipped with parental controlled 'chip' which shuts off viewing for programmes carrying 'violent' rating. Opponents deny there is direct evidence of violence in programming and streets being connected; others are suggesting 'sex chips', etc. for programmes with content deemed undesirable for youthful viewers.

Scandinavian Nokia has TV sets on market with 'anti-burglar' options. Sets turn on at random times, change channels and volume settings and flip through teletext messages all in effort to convince burglars that somebody is at home (!).

PHILIPS backed CD-I players now being stocked in 11,000 retail outlets worldwide; will be 13,000 by end of year including nearly 3,000 carrying CD-I under Magnavox label name in US. Model 200 'low end' player (NZ\$700) is appearing in US stores now; 'high end' CDI-220 package (NZ\$900) includes Compton's (interactive) Encyclopedia disc. Model 200 released in Japan carries NZ\$1100 price tag. To allow play of 5" CDs with up to 74 minutes of video (movies), full motion video (FMV) adaptor has US prerelease list price of NZ\$450; \$600 in Japan. In marketplace, FMV cartridge is being called Digital Video Cartridge (DVC). Glitches in CD-I video CD programme continue (see CTD 9309; p.18); shoppes may need to carry two versions of CD-I discs for each title. Version 'one', for CD-I players with FMV cartridge have 'limited interactive' capability and can only be played on FMV cartridge equipped system. Version 'two' formatted to Video CD 'standard', which will not be released until fully dedicated CD-I video players are released, will play on FMV or dedicated Video CD players. Anyone purchasing early FMV format discs may later wish they hadn't as full feature play will be limited to FMV cartridge adapted machines. Further glitch; 'big deal' signed between Philips and Paramount for release of 50 films on CD only applies to distribution of discs in Asia and North America. Films cannot legally be distributed outside of those regions and Europe is included in 'banned' area. First films now available on CD-I are Apocalypse Now, Hunt For Red October and Top Gun. Variation of system recently shown; '3D-I'. Viewers wear 'goggles' equipped with miniature video display system, creates stereoscopic effect (i.e., 3D). First 3D-I programme ("7th Guest"; interactive movie where viewer makes plot decisions) is now available. Philips hopes to have sold 100,000 units in US by end of 1994 where dealers are reporting 'margin' of 25% on Magnavox model(s); 7-8% below markup on Philips branded products. A NZ\$36M+ advertising budget is now being spent to introduce product in North America working out to NZ\$360 per CD-I unit at 100,000 level forecast to sell by end of 1994.

CD-I NOTES: Confusion over what is, is not video CD format continues even at highest manufacturing levels. It seems to be sorting out as follows:

- 1) Video CD system is 'fully based' upon karaoke CD format using Video CD disc CD-ROM/XA software.
- 2) CD-ROM/XA standard uses active data 'flag' which will switch off audio output(s) on some (but not all) CD audio players. The 'flag' is present whenever disc is playing, not merely as 'header'.
- 3) Video CD discs can be played on dedicated Video CD player, computer with CD-ROM drive if equipped with MPEG-1-decoder, and, CD-I player equipped with optional MPEG-1-based full motion video (FMV) cartridge.
- 4) The 'XA' active data 'flag' tells players there is non-audio (i.e., video) data in the stream and the presence of this 'flag' turns off the CD player external-output audio jacks to prevent non-audio digital 'trash' from appearing in the usually-connected audio sound system of the player.
- 5) UK firm Nimbus Technologies attempted to have Philips et al change this formatting, hopeful that by so doing a sizeable percentage of the existing audio CD players in the marketplace would be able to adapt as Video CD players with an external MPEG (video) processing unit. Nimbus saw this as a way of speeding up consumer acceptance of Video CD without forcing consumers to purchase dedicated video CD players. Philips et al resisted this suggestion

and for the moment it is a dead issue. Philips system is based upon something called "White-book" standard, Nimbus wanted Video CD to be based upon (older) "Red-book" standard.

Stand-alone (dedicated) Video CD players will be next manufacturer 'battle ground'. Philips insists it will not rush out stand-alone Video CD player, rather will push CD-I players adapted to video with FMV (full motion video) cartridge. Sony and JVC both admit they plan to introduce players around middle of 1994 and both are likely to include disc changer mechanism in player since 74 minute maximum length of Video disc is seldom adequate for a full movie-length feature. Philips FMV package requires user to change discs manually at end of play time.

Portable (industrial model) CD-I player from Sony is now on market in Asia. Unit weighs less than 1kg, sells for NZ\$2100 and is intended for industrial marketplace. Sony's first model, also industrial, includes built-in LCD screen at NZ\$3500.

Optical laser disc manufacturer Pioneer does not believe the changeover to a fully digital world will begin in Ernst before 2000 and their now-established technology is not going to 'roll over' with introduction of CD-I/Video CD competitive technology. Pioneer expects to end up current fiscal year (31 March 1994) having shipped 1.6 million laser disc players worldwide. Current production capacity is 160,000 per month. Major new markets for players seem to be driven by 'karaoke' with Asian sales rising from 270,000 to 640,000 (+237%) in most recent 12 month period. Pioneer has begun shipping newest LaserActive (LA) format which has play and record plus interactive abilities, produces a high resolution picture and holds a full length movie on a 5" disc. Basic LA retail price will be near NZ\$1500 for player plus optional Sega games/TurboCrafX software module (NZ\$900) and optional Laser karaoke module (NZ\$550). Pioneer also believes the full transition to digital videodisc (DVD) must wait for the availability of 0.460 micron resolution 'blue' laser which one developer (Sony) reports will be ready as commercial product by 1998 (CTD 9309; p.20). LaserActive/Laserdisc software expansion has priority in 1994. Pioneer has also announced their own proprietary digital videodisc format (Alpha Vision) using 5" optical disc and data transfer rate of 4.7Mbits/s. They plan a March introduction of commercial karaoke 500 (optical CD) disc changer package using new technology MPEG-1 format at NZ\$29,000. System compresses video to 2.5% (1/40th) of original bandwidth.

Nippon-Columbia plans early-94 shipment of video CD karaoke package with 200-disc CD module and 3 changers. No price has been announced; they plan home version late in 1994.

Reality Immersion Technology (RIT) will be next step in electronic games according to Nintendo. Firm has signed agreement with Silicon Graphics Inc. (SGI) to format advanced 64-bit video entertainment system with 1995 release date. RIT enables players to 'step inside' of 3 dimensional real time world by wearing special display goggles/head cap which create very real illusion that player is inside of and surrounded by the game being played. Panasonic 32-bit system based upon 3DO technology is now in US stores. SEGA plans a late-94 introduction of 32-bit RISC (reduced instruction set computing) chip video game system using Hitachi SH series components with a target street price of NZ\$550 for 32-bit console and NZ\$350 for optional CD-ROM drive. Atari 32-bit package ('Jaguar') due out now and Commodore is now shipping Amiga CD-32, a 32-bit game console using Amiga protocols with which it has peripheral (mouse et al) compatibility. Commodore says 50 software titles are also available, and unit is prepared to accept MPEG cartridge for FMV when available. Apparently most of the game field contenders believe the big marketplace battles between 32-bit technologies will be late in 1994, just in time for that year's Christmas selling period.

NINTENDO has been cleared in Michigan (USA) jury trial of allowing medically sensitive consumers to use its games without proper health warning. Plaintiff had claimed company should have included warning with games that their use might trigger 'photosensitive epileptic fit' which she claimed happened to her. She sought damages and court order that games be marked with health warning; lost on both counts.

Interactive Music CDs is edge-of-technology market niche carved out by small (18 employee) but established California firm Ebook. Their product is dual-purpose; you can play on your (audio) CD player, or, plug the CD-ROM disc into your computer disc drive and mix music with video, photographs, artwork or data on your computer screen as the music plays. Microsoft initially released Voyager's Beethoven and follow up firms patterned similar releases towards computer owners whom they believed were more into the 'video' than the audio content. Ebook believes the opposite is true and titles featuring Kenny Loggins, Jessica Williams, Duke Ellington, and Woody Herman have been announced with Red Hot Chili Peppers and Alice Cooper likely to be available before Christmas. Other Ebook titles ('Jazz: A Multimedia History' and 'Mozart') have drawn raves bordering upon being overly generous. Is Interactive Music CD format a music package, or a video package? Ebook and others are still refining the art and at NZ\$36 there's no shortage of sales.

JVC will begin USA marketing of videogame console with built-in Sega CD drive early in 1994. Product is called Wondermega in Japan, should carry list price of NZ\$1200.

US Information Superhighway initiative, promoted by President Clinton and VP Gore, would attempt to change interfacing between voters and bureaucrats. Massive amounts of US data, including census, would become available 'on line' to computer-modem equipped citizens and network would interconnect homes and businesses with educational institution, library, science and government data banks. Government would use interactive networks to solicit input from voters during formative stages of legislation creation, provide multiple electronic bulletin boards as assist to citizens seeking information, and expand government's own use of E (electronic) mail. Twenty-five member advisory council has been formed with mandate to design system and assure access/use charges are held 'low' to allow mass use by 'average citizens'. President Clinton hopes to obtain enabling legislation during 1994.

ITAG, Information Technology Advisory Group, is New Zealand 'think tank' assembled by Minister of Communications' Maurice Williams. ITAG's nine members are to meet regularly with government agencies to assess agencies of the rapidly developing 'information technology' issues. The group's own objectives are still being defined, but it hopes to bring cohesion to the many changes now taking place in telecommunications, broadcasting and computing and to bring a coherent overview of these changes to the appropriate government agencies including education where many IT (information technology) opportunities exist. Steve Trotter, managing director for Unisys New Zealand, is presently the spokesman.

CHINA is largest market in world for illegal pirate CDs according to London based watchdog group. Report says number of CD plants being established to manufacture non-copyright-cleared discs has tripled in last year with total annual output of more than 215 million CDs this year. At railway shoppes near Kowloon (Hong Kong) some 30 stores sell huge volumes of pirated CDs at average price of NZ\$5.76 each and down for volume purchases. Counterfeited CDs do not respect source lines; in addition to extensive selection of European and North American releases, Mandarin and Cantonese titles are also widely offered.

CABLE/FIBRE OPTIC TELEVISION

Telecom Auckland (Pakuranga/New Lynn) 600 home 'pilot' fibre optic test is actually interesting mixture of traditional coaxial cable and fibre. 30-strand fibre extends into each 300-home area as primary 'trunk' with four-strand fibre serving as 'distribution' cable to individual customer fibre to RF conversion equipment housings. 'Fibre to curb/kerb' is possibly misnomer since conversion from fibre to coaxial cable (i.e., light waves to RF waves) takes place in equipment boxes which typically serve 16-20 homes each. From these above ground light grey (colour) boxes, traditional RG-6 or RG-11 coaxial cable carries VHF (TV) signals into individual homes. The fibre thus stops up to several hundred metres from the 'curb/kerb' fronting on individual homes. Additionally, to provide (AC) operating power to individual lightwave to RF converters, and to RF broadbanded amplifiers, a length of traditional CATV .412 (10.5mm) aluminum jacketed coaxial cable snakes throughout each pilot system from equipment box to equipment box. This (red stripe mark on jacket) cable is necessary since despite of all of the wonderful qualities of fibre optic cable, nobody has yet been able to figure out how you transport AC or DC voltages through a strand of (insulating) glass material. The .412 could have a dual purpose; if the fibre optic plant ever failed, with minor modifications the .412 cable could easily become the transporter of the TV channels as well just as it does in thousands of 'traditional' cable TV systems worldwide.

Telecom's US owners, Bell Atlantic and Ameritech (nearly 25% each), might lose interest quickly in recently launched Auckland suburbs fibre optic tests following Virginia (US) court ruling that now clears way for American telephone companies to enter cable TV business directly there. Until ruling, telephone firms could own cable but not in same communities as their telephone systems; now cable and telephone can be in same community. Prior to US ruling, this made Auckland suburban tests unique place in world where a telephone company could use its own facility for simultaneous delivery of telephone and cable TV services. Bell Atlantic's Arthur Bushkin said as result of ruling, firm would "move quickly to begin operating cable systems within region and elsewhere". Ameritech's Richard Brown said "(this ruling is) an important guidepost in defining who participates in the information marketplace of the future." Foes of the ruling, including National Cable Television Association, plan a court appeal of ruling which secondary court decision said applies only to Bell Atlantic and only to (state of) Virginia test case situation. One counter argument being 'floated' is that telcos should not be allowed to actually compete in cable TV arena until cable has equivalent opportunity to compete in 'all' aspects of the telephone business. Alexandria (Virginia), where Bell Atlantic is likely to exploit US court decision, already has established conventional cable

Bell Atlantic and cable-giant TCI will merge if US federal approvals can be gained. New firm, valued near US\$60 billion, would be largest telecommunications telephone and video operating company in world. TCI owns extensive interests in cable TV programming and distribution industries as well as being largest multiple-cable TV system operator in world. TCI's holdings include interest in Kiwi Sky TV where Bell Atlantic is also part owner. TCI is also backing DBS (direct to home) service provider in US, has bought extensive interests in European cable and TV programming firms including in UK where they are competing through fibre optic cable systems with British Telecom for telephone service revenues. US authorities are expected to approve merger.

operator which recently announced it will offer cable customers two-way interactive connection with computer Internet facility.

Philips greeted news of Bell Atlantic court ruling with optimism. Spokesman said ruling signals "an end to the cable monopoly and the dawn of a new age of 2-way digital video communication. With a single (MPEG based) standard for broadband digital communications via fibre telcos can do what cable companies cannot do." Philips said it would begin production of home (MPEG) decoder at (Greenville, TN) USA plant "regardless of standards" chosen by Telcos. Philips believes telephone companies will opt not to sell or rent terminal equipment (for home, office use) themselves and sees "multibillion-dollar bonanza for consumer electronics industry" as a result of decision.

Kapiti's Kiwi Cable TV has received a published apology for a misleading story that appeared throughout New Zealand July 5-6. The story ran under various headlines, including "Piracy Check On Station", and implied that Kiwi Cable's July launched Movies On Demand cable service was being investigated by the (New Zealand) Film and Video Security Office for alleged 'video piracy'. Apparently one source of the misinformation was Columbia Tristar Hoyt Home Video's general manager who subsequently retracted his comments and issued a statement that in part said "The references to video piracy in the article were unfortunate. I am satisfied that Kapiti TV and Home Video Network (HVN; provider of the films) were acting with 100% integrity". Video rental shoppe operators reacted loudly when asked to comment about Kiwi Cable's new service, many apparently fearing the spread of Movies On Demand could cut into their own business. The news wire distributed the story nationally and painted Kiwi Cable as a firm that had stepped over the boundaries of the New Zealand copyright law. The less widely distributed retraction corrected that impression. Telecom's Pakuranga/New Lynn fibre optic pilot systems also plan to test-market video-on-demand services starting this coming winter.

NOTE: CTD's sister publication **TECH BULLETIN** has begun a two-issue in-depth look at cable TV as a business venture in New Zealand with its recently issued November 10th issue. Readers with an interest in cable TV, 'the business', are encouraged to contact Tech Bulletin (P.O. Box 330, Mangonui, Far North) with payment of \$30 enclosed to receive this two-part detailed report.

GREYMOUTH's planned cable system under trade name PacSat and backed by John Rutherford's Civic Enterprises Ltd. (P.O. Box 1959, Christchurch) hopes to introduce first channel of service, TV3, before Christmas. PacSat will use 'knife-edge refraction' reception technique to pull Christchurch TV3 transmitter off-air at Hokitika across Southern Alps, then use private (AML) microwave or channel 11 TV translator to feed signal from Hokitika north to site near Greymouth. Knife-edge is a bent-ray technique pioneered in the 50s in North America. A sharply defined mountain ridge/peak, if fortuitously placed on path between transmitter and receiver, will actual enhance (amplify) signal rather than block it. Benefits of knife edge include virtually no signal fading and immunity to weather effects. Rutherford obtained technical paper describing technique and followed instructions to locate Christchurch signals on west coast of South Island. PacSat says it has agreement with Westland District Council building (Hokitika) to locate their TV3 off-air antennas there. In Greymouth, elevated AML microwave receiving site is 'on-trade' with resident there receiving free PacSat service in exchange for site use and electricity needed. TV3 will be offered 'free' to Greymouth cable subscribers for initial period (up to six months) while firm arranges additional TV channels for system. Possibles include bringing Christchurch CTV over same knife-edge route. Civic Enterprises filed for eight 12.750-13.250 GHz 'AML' microwave channels this past winter with Ministry of Commerce and firm's John Rutherford has arrangement with San Diego supplier of refurbished Hughes AML equipment for transmitters and receivers. **NOTE:** 14 page technical paper which Rutherford used in locating wayward Christchurch signals on west coast is available from our '**Tech Data File**'. Request 'Knife-Edge 93' at a cost of \$25 per copy from Robert B. Cooper, P.O. Box 330, Mangonui, Far North.

Telephone companies in the USA, until recently banned by regulation from being owner/operators of cable systems in the same community where they operate telephone service (but not in other communities) have now been given the green light to own and operate so-called 'wireless cable' co-located with telephone systems. Wireless cable

uses 2.1- GHz frequency band(s) for point-to-multipoint transmissions serving viewing subscribers with encrypted transmissions consisting of same general cable fare as found on wired systems. New Zealand has 12 channels, 8 MHz wide, allocated in 2.3 - 2.396 GHz region but none are presently in use.

CellularVision 28 GHz test system in Brooklyn (New York) has attracted second major investor. Bell Atlantic became minority investor in August; Philips Electronics has revealed it also has invested in trial system. CellularVision has New Zealand proponents and Ministry of Commerce has received enquiries regarding use of 27-29 GHz frequencies for this purpose (CTD 9309: pages 21-22). Transmission and reception hardware for system is only available at developmental level in small quantities. Under ideal line of sight transmission conditions, range of up to 10km is possible for broadbanded multiple-channel TV service. Brooklyn tests show under most conditions range is closer to 2km and path losses during moderate rains are considerable often shutting off service to viewers.

Mercury Communications has agreed to interconnect with the telephone network UK cable television firms who are now providing local-area-network (LAN) services to cable subscribers. Mercury is second largest telecom in UK, after British Telecommunications, and recently built UK cable systems employ fibre optic networking with combination of telephone and cable TV functions. Analysts see 'marriage' of local cable and Mercury as strengthening competition to BT and affording both cable operator and Mercury opportunity to package thru-put communication offerings which either independently could not do. By law, BT is prohibited from operating cable TV systems in UK but UK cable systems owned by US telecoms Nynex and Southwestern Bell are involved in Mercury interconnect deal. Nynex spokesperson said "We will be able to use the experience and lessons learned from these operations when the US cable market opens more fully." The US court decision to allow telephone companies into the cable business in USA (see prior report) is her reference here. Shortly after Mercury announcement, competitor BT responded with own announcement: It will allow interconnections to 60 - 135 UK cable operations in deal BT spokesperson characterised as being "worth tens of millions of pounds." British Telecom has also been given approval to begin testing video-on-demand through telephone lines during 1994. BT will apparently follow approach of USA telephone companies by marrying ADSL/HDSL compression technology (see CTD 9309; September 1993) to their hybrid fibre optic/copper plants; UK cable operators threaten decision with UK court case.

Telecom Australia plans to 'test' video-on-demand through fibre optic and copper house run telephone lines. AWA Limited has been selected to provide the proto-type hardware for the demonstration system (see discussion of ADSL/HDSL in CTD for September 1993).

TeleWest International, co-owned by US cable giant TCI and American telco US West, has purchased 6 cable franchises in central Scotland from another American owner; Washington Post Company. The franchise area has 420,000 homes, cable passes 90,000 of these and there are 19,500 subscribers presently. Seller said they were not prepared to deal with rapid expansion of UK cable systems into telephone market place (most UK cable systems are urgently adding fibre optics to become 'all-services' provider) while buyers said they viewed opportunity to do just that 'compelling'. Systems are located in/near Cumbernauld, Dumbarton, Falkirk, Fife, Strathclyde and Tayside.

Auckland International Airport's new expansion includes the largest (non-telecommunications firm owned) fibre optic connected closed circuit TV (CCTV) system in the country. Centred on the new international terminal at Mangere, video and data links using fibre optic interconnections provide a totally immune, secure network in an environment filled with man-created noise and RF interference sources. A New Zealand firm, Fibernet New Zealand (Neil de Wit, managing director 04-237-9144; FAX 04-237-9195), was responsible for the system design and installation.

11.22% of major cable/publishing/television/movie empire Time Warner Entertainment is owned by two closely related Japanese firms. C. Itoh, Japanese trading company, and Toshiba own all of TWE not held by telco US West (25.1%) and Time Warner parent (63.27%). US West is paying NZ\$4.5 billion for its stake.

Dutch cable TV viewers (90% of all homes in Holland are cable connected) have high penetration of teletext decoder equipped TV sets; 70% according to Dutch cable survey. Using traditional telephone lines as ordering network, Dutch viewers are now able to access vast information data bases which are archived at central facility. Cable viewer selects subject from menu and using touch-tone telephone places order by number. Within typically 0.01 second the customer's selected material is delivered into home on cable TV system via teletext serving channel; information on demand.

US cable firm Continental will offer its cable subscribers option of being connected directly into computer Internet service via cable TV lines after 1 January. Primary benefit to users is upgrade from telephone-line limited 9.6Kbps to 10Mbps data rate. Via cable TV connection, service will be named InterCable and go initially for NZ\$135-180 per

month with rapid drop in charges anticipated as volume grows. Using 'on-the-fly' data encryption for security, InterCable will modem connect via Ethernet.

Major cable trials are planned by interactive multiplayer creator 3DO. Firm, with Bell company backing, sees merging of technologies driving development of interactive video formats and players during next two years. It likens the present stage of interactive TV growth to early days of (audio) CD industry where numerous formats were floated for trial before full international standard was determined. 3DO 'launch' in US marketplace with first players and software is now underway with Panasonic as major brand supplier. 100,000 players are expected to be shipped into USA before end of this year. Sanyo is likely to be second brand to supply product after first of year. Basic player has NZ\$1200 range selling price.

Study of 1993 cable TV system sales in USA places value of cable businesses at between NZ\$4004 and 4368 per subscriber. Traditionally cable system selling prices have been established by annual 'cash flow' of systems and/or potential for system growth in recently cabled areas. Appreciation of cable system net worth has risen dramatically in last decade from 1980 average value of NZ\$546 'per subscriber'.

TERRESTRIAL BROADCASTING

New Zealand schools can establish campus-wide coverage using low power TV transmission facilities under interim guidelines now in effect by the Ministry of Commerce. Pakuranga College (Pigeon Mountain Road, Bucklands Beach, Auckland; Gordon Lawrence, Chairman Media Studies Dept. (09) 534-7159) pioneered service 18 months ago; uses students to produce daily 12 minute 'Today At Pakuranga College' telecast. Faced with sizeable cost estimates to bury coaxial cable for entire facility as means of distributing videotaped A-V materials, or staying with 'old' system of physically transporting tape decks and players to individual classrooms on demand, school went to Auckland supplier Signal Master (Kevin Dawkins; 09-525-5599) to package 0.5 watt (eirr) transmitting package on channel 42. Ministry created special low power class of transmission, limits power and range to essentially school grounds in most cases. Channel 41 is set aside for this purpose nationwide; channel 42 in Auckland. Pakuranga College already owned and used two-camera/video switcher system plus multiple tape decks; cost of adding 0.5 watt transmitter package, antenna estimated at \$3,000.

Unlicensed FM broadcasting in 88-101 MHz range (see CTD 9309 report, p.23) using 300mW RFS/Ministry approved transmitters is developing rapidly. Because Ministry does not assign operating frequencies, 'squatter's rights' rules apparently apply. Would-be network operator Tourist FM had established multiple transmitters throughout downtown Auckland areas on 88.2, 100.4 and 100.8 MHz by early September using internal solid-state audio memory loop in each to announce 'coming availability of tourism radio service' apparently hopeful this would preempt others from using same frequencies. With typical ranges of 3km and down, covering a region such as Auckland requires several transmitters per 'channel'. Equipment supplier VEXX Digital FM Ltd. (10 Relko Cres., Torbay, Auckland; 09-473-1818, Jay Mather) meanwhile had 100.4 MHz transmitter situated at Hoyt's Cinema, Glenfield on northern edge of Auckland City announcing films and running schedule. Approaching the Auckland bridge from Glenfield side, Hoyt's Cinema announcements gradually blend into Tourist FM self-promotion as both transmitters become audible for several kilometre distance on same frequency. Ministry rules state such approved-but-unlicensed transmitters must cease operation if they cause interference to licensed transmissions; rules do not address interference between unlicensed transmitters 'sharing' same frequency. Another potential 'user group' recently discovering this medium; educators. At least one Auckland area college is planning 'school radio station' using basic non-memory equipped VEXX transmitter; believes it can put 'station' on air for less than \$1,000.

The Ministry of Commerce is not totally happy with the 'explosion' in unlicensed FM broadcasting. Responding to an Official Information Act request, MOC advises CTD *"You should note that the 100.2 - 100.8 MHz range is specifically intended for microphone and 'stereo sender' applications, although other uses are not excluded. Presently 300mW (EIRP) is permitted but it would appear this is excessive in relation to the range of models of radio microphones available and will be reduced to 100mW (EIRP), in respect to new exemptions, in a forthcoming reprint of RFS29. However the reprint will also specifically refer to a wider range of applications (e.g., 'Talking Billboards')."* In a subsequent follow-up communication, MOC told CTD *"A complete new set of regulations (under RFS29) will apply from 15 November."* At the risk of second-guessing MOC's plans, it would appear they have two options: (1) Establish 'talking billboards' (the Tourist FM type of service) as a separate category and retain the 300mW power level as permissible, or, (2) close the door on this 'loophole' and not allow further type approval of (any) 300mW equipment in this frequency range. You might contact Ian Hutchings (MOC: 04-471-0030) if this concerns you or your business.

Television New Zealand has acknowledged that digital television technology will change the way it does business. Commenting on the firm's \$14,288,000 after tax profit in the half-year ending 30 June, TVNZ Chairman Norman Geary noted 'The arrival of digital compression of transmission signals will increase the availability of channels by at least four and result in increased competitive pressures.' He also noted that TVNZ 'intends to expand the range of channels and services it offers to the New Zealand public', using the benefits of compressed digital technology. TVNZ claims it has a 83% market share, split between TV1 (48%) and 35% (TV2).

Ministry of Commerce announcement, contained in house publication 'Spectrum Views' (Vol. 2 No 5), of project to assign 'management rights' to present VHF (band I and III) channel holders TVNZ and TV3 drew little comment at first. That was before NICAM oversight was noticed by amateur radio group worried about how granting of management rights might have some effect on New Zealand's amateur allocations. There could be a major 'OOP's' here and MOC personnel appear to be scrambling hard to sidetrack it from public view. A standard PAL-B (VHF) TV channel is 7 MHz wide. The video carrier frequency is assigned approximately +1.25 MHz above the lower channel edge; for example channel 1 is 44-51 MHz, with the visual carrier nominally 45.250. When the European (digital type DPQSK NICAM) stereo system was adopted, its primary centre frequency was placed 5.850 MHz above the visual carrier frequency to avoid NICAM interference to the same channel's monaural TV sound or colour sub-carrier information. So far so good. But when you add 5.850 MHz to 45.250, you are at 51.100 MHz. Notice that this is .1 MHz (100 kilohertz) above (i.e., outside of) TV channel 1's allocation of 44-51 MHz. It gets worse. The NICAM signal when fully modulated is 510 kilohertz wide. Centre this at 51.100 and you have NICAM stereo data extending from 50.840 upwards to 51.360. Now we have the upper edge of channel 1 NICAM 360 kilohertz outside of TV channel 1. Under Management Rights scheme, 20 year 'ownership' of a specified piece of spectrum at a specified transmitting location is given to rights holder. So, is channel 1 with NICAM stereo the official, allocated, 44-51 MHz 'chunk' of spectrum, or, is it 44-51.360 MHz? If you answer 51.360, how do you explain this to the amateur radio operators who hold a national allocation of 51-53 MHz? In a memorandum written by MOC policy maker Ian Shearman, he tells his superiors "*(if amateur licenses are not cooperative), point out to them that the alternative would be for them to cease (all) operations (in the remaining 51.360-53.0 MHz region)*". Shearman's response reminded some incensed hams of oft-cited 'rape threat' warning; "relax and enjoy it, or ..." and they are considering legal challenge not only for management rights sell off plan for TV channel 1, but for MOC/RFS initial violation of their national allocation which New Zealand agreed to in concert with more than 100 other nations during World Administrative Radio Conferences dating back to just after WW2. One amateur advocate believes annual licensing fees, collected for channel 1 use, should be shared with 'amateurs' who have had their frequency assignment 'violated'; \$30,000 per year is mentioned to be paid by government to national amateur group NZART. It gets worse for MOC management rights plan. Because each VHF (band I and III) TV channel is 7 MHz wide, and every NICAM equipped transmitter requires an average of 360 kilohertz of space 'borrowed from' the next upper channel, MOC is faced with serious problem. If it defines a management right's channel using their own 1960-based allocations table, when they grant channel 2 in Auckland to TVNZ (for example) they are also throwing in 360 kilohertz on channel 3 to allow for NICAM. Take North Island Ruru site for TV3 on channel 9; TVNZ is allocated channel 8 at Huntly, well within Ruru's TV3 coverage. Would TVNZ, or TV3, own that chunk of channel 9 where NICAM stereo falls from channel 8, in Huntly and surrounds? Multiply this interloper example by the hundreds of allocations and you have a grasp of the final paragraph in Shearman's memorandum, obtained under Official Information Act provisions: "*It appears several different solutions may be needed to ensure that all impediments are overcome.*"

Ministry of Commerce 'Discussion Paper (DP1)' issued July 1993 sought 'comments' from interested parties relative to proposal to add spectrum users below UHF channel 27 (518-526 MHz) but above channel 11 (223-230 MHz). Paper seeks comments on adding new management right users in 470-518 MHz range which some have suggested be allocated for two-way radio (470-494 MHz) and three new television channels (i.e. channel 24 / 494-502, channel 25 / 502-510, and channel 26 / 510-518 MHz) with possibility that present channel 1 transmitters (44-51+ MHz) be reallocated by 'migration' to these new frequencies. Equally possible is the three newly suggested TV channels could be set aside as test-bed for on-air trials and development of compressed digital video (CDV) technology. Ministry of Commerce, by selling off majority of available UHF TV spectrum (less channels set aside for Maori and low power use) and by having allocated virtually all usable VHF channels, really has no 'room' to develop digital television in New Zealand. TVNZ has stated it sees digital coming, expects no fewer than four programmes within present 7/8 MHz channel width and it expects to 'add new programme services itself' by using digital technology. Spectrum from 494-518 MHz, if used for digital purposes, would be equivalent to not less than 12 of

the present analogue channels; i.e., this 24 MHz space could accommodate as many TV programmes nationwide as present 11 VHF channels thereby freeing up 77 MHz of VHF space for other users.

Nelson has two new UHF television stations on the air. BAYS TV, channel 33(H), authorized to transmit with +30dBw EIRP, began operation early in October initially with rotation of four on-tape programmes including one that try's to help viewers properly select a UHF receiving antenna and install it. Mainland TV, channel 61(H), authorized to transmit with +35 dBw EIRP began operation mid-September with character generator (text) that includes local community announcements and 'classified' advertising. Neither station had begun 'entertainment' programming as of mid-October. Both channels have quite consistent signals to at least the Taranaki/Cape Egmont area; well beyond 'predicted' coverage for the relatively low power stations.

A regional/national 'network' backed by Horizon Pacific says they could be telecasting as early as March according to a spokesman. The first three (UHF) transmitter sites to be activated would be in Auckland, Wellington and Hamilton with Dunedin and Palmerston North to follow 'shortly after'. Stations, originally promoted as 'local' television with networking between 'affiliated stations' may turn out to be a 'national network with local breakaways'. At one point individual stations hoped to have minimum of 30% of each broadcast day produced at local level. Individual stations are to be funded by local money (80% + per area) but 'network management terms' and scheduling would be done from Auckland headquarters raising concerns network may be more like early TV3 days relying largely on bargain-priced imported programming than New Zealand content.

SKY's 'groundwork' in preparing viewers to be served from new Mt Erin transmitter sites includes advising people residing in peripheral communities not to expect service. Mt Erin TVs 1, 2 and 3 on channels 6, 8 and 10 (V) feed 20 translator sites, most of which have yet to be equipped for TV3. Public reaction to arrival of SKY 'in area' has been high and SKY is learning it may be better to 'turn people off' in advance of dashed expectations. By placing news stories in community newspapers, SKY is advising these translator fed areas not to expect service. Creative antenna installers, however, armed with the latest reception-extending technology, are already scouring hilltops locating suitable reception sites for anxious customer's remote antennas. SKY knows how to solve these problems from personal experience. Example: A SKY exec with a summer home at Langs Beach (Bream Bay near Waipu south of Whangarei) wanted SKY service but distance from Auckland and Brynderwyn Hills blocked reception. SKY went to a German firm to design a two-channel 6 watt 'translator' that converts SKY channels 27 and 31 to 28 and 32. The unit was installed in farm paddock atop Brynderwyns and provides SKY Movies and Sports to exec's home plus others in Mangawhai Heads region. SKY has not revealed cost of the project.

German ZDF network plans to begin 16:9 widescreen TV transmissions 'by end of year', year-plus in advance of original time table. PALPlus transmits letterboxed picture to conventional screens after encoding widescreen extensions into black (letterbox) bands above and below video. Supporters accept PALPlus is 'interim technology' to bridge transition from conventional analogue to digital TV. Scandinavian Nokia, third largest TV set builder in Europe, promises 16:9 TV sets.

Vietnam could have first 'pay television' channel, similar in concept to New Zealand Sky Network TV, early in 1994. Australian publisher of Vietnam Investment Review is teaming with government owned Vietnam TV and two French programming companies to operate service in Hanoi and Ho Chi Minh City.

TVNZ's 15% share in Fijian-1 television is likely to include subscription television (ala SKY here) services as well as free-to-air television. 71% of the enterprise is to be owned by Fijian public and government.

COOP AT CAMBRIDGE

CTD Publisher Bob Cooper will conduct a seminar at Cambridge for the Waikato Branch of ETSA (Electronic Technology Services Association) at 6PM on December 7th.

The topic will be 'The Second Coming Of Satellites'. If you would like to attend, contact Mr. Fred Ritchie, National Secretary for ETSA at 09-483-7430 in Auckland.

CONSUMER ACTIVITY STATISTICS

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Data Compiled through 30 September 1993

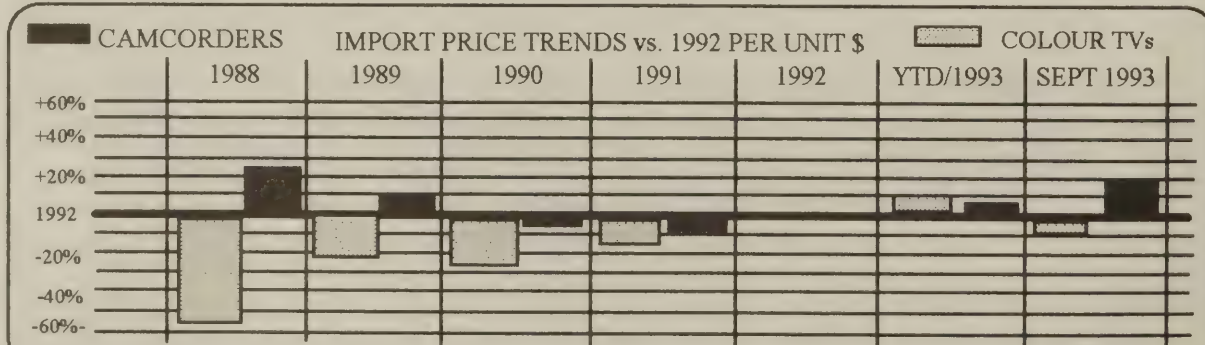
SYNOPSIS: Imports in four key areas (colour TVs, black/white TVs, camcorders, {audio} CD players) continued to lag behind 1992 levels during the third calendar quarter. Compared to 1992, colour TVs are down 32.8%, camcorders down 41.1% and CD players down 43.3%. In the VCR area imports are up 5.6%. At the same time the volume has gone down, the average price per unit imported has increased over 1992 12 month averages for camcorders, audio CD players and colour TVs. Some of this can be attributed to less favourable YEN to NZ\$ exchange rates but a close study of the 'points of origin' for TVs (see report to follow) reveals only 10.14% of imported TV sets originated in Japan through 30 June and the percentages have changed little in the third quarter.

In comparison, European consumer electronics at end of 1993 are expected to be down 6% overall from 1992 with TV sets down 5.5%, VCRs down 9% and camcorders down 5%. For first 8 months of 1993, the US reports direct view TVs +8.6%, projection TVs +14.8%, VCRs -5.9%, camcorders +17.8%. In Canada, Japanese shipments are down: VCRs -46.5%, camcorders -10.4%, CD players -9.8%.

Price comparisons where 9 month statistics allow merging between countries: Average Japanese camcorder imported into NZ has dutiable cost of \$1,232.77 while average model imported into USA has dutiable value of US\$546.92 (NZ\$995.39 at NZ\$ = US\$1.82). Average VCR from Japan comes into NZ at NZ\$543.27 while Japanese VCR into USA has dutiable value of US\$291.12 (NZ\$529.84 at NZ\$ = US\$1.82); in both examples New Zealanders are paying more for Japanese equipment than American counterparts.

Note: Raw data compiled by **Statistics New Zealand** on a monthly basis. Data extrapolations, interpretations are done by **Coop's Technology Digest** and right or wrong, we are responsible for presentations. Full report 02/95.

	1988	1989	AVERAGE PER UNIT/NZ\$			YTD/1993	SEPT 1993
			1990	1991	1992		
B & W	\$ 71.10	\$118.89	\$ 97.90	\$144.30	\$389.27	\$311.64	\$423.82
COLOUR	\$297.79	\$411.75	\$393.05	\$455.79	\$525.23	\$572.59	\$471.24
CAMCRDR	\$1,469.10	\$1,290.85	\$1,144.68	\$1,102.93	\$1,173.22	\$1,232.77	\$1443.32
VCRs	\$458.36	\$437.38	\$429.91	\$411.55	\$494.30	\$483.43	\$453.58
CD PLAY.	\$225.51	\$214.17	\$193.06	\$212.92	\$227.20	\$263.87	\$328.99



COUNTRY OF ORIGIN

Imports of electronics into New Zealand draws upon several dozen (foreign) origin sources and varies widely with products. In the study shown here, tracking **1993** import country-of-origin for colour TV sets, camcorders, VCRs and (audio) CD players there is a considerable price-to-origin relationship. In the case of colour TV sets, price also translates to screen size which means certain screen sizes are dominated by producers from specific countries. In colour TVs (bottom analysis) read screen size from top to bottom; **bold face** is leading country of origin for size.

CAMCORDERs		VCRs		(AUDIO) CD PLAYERS		
Average landed cost / \$1,232.77		Origins:		Origins:		
Origin:		Japan 67.3% \$543.27		Japan 66.0% \$253.43		
Japan - 99.3%		Malaysia 22.9% 386.08		Singapore 10.9% 197.71		
		Korea 9.2% 287.22		Malaysia 7.5% 293.92		
		\$\$\$ is average of all units imported from country.		Peoples Rep. China 6.5% 110.17		
				Australia 4.3% 129.91		
				Taiwan 1.7% 316.96		

COUNTRY	< 330 mm	331mm/360	361mm/460	461mm/510	511mm/560	>561mm
KOREA	2.8% \$328.95	19.6% \$271.03	18.8% \$425.59	29.5% \$433.96	23.0% \$374.52	5.4% \$684.21
SINGAPORE	96.0% \$284.31	17.9% \$311.85	53.3% \$393.91	19.4% \$406.44	20.2% \$518.13	20.5% \$935.53
P.R. CHINA		10.4% \$253.61		4.4% \$306.77		
HONG KONG		15.5% \$257.40		14.8% \$305.88	4.2% \$298.21	4.0% \$654.03
JAPAN		1.6% \$267.57			4.0% \$1,251.27	39.4% \$1,455.92
MALAYSIA		33.1% \$372.67	27.5% \$529.63	31.8% \$428.87	44.9% \$594.02	13.5% \$707.42
USA					3.1% \$365.69	
AUSTRALIA						10.9% \$888.60
UK						6.2% \$1,184.56
MEDIAN \$	\$285.57	\$307.63	\$437.35	\$402.39	\$534.76	\$1,095.97
FOR SIZE						

2.3 GHz MANAGEMENT RIGHTS

A Radio Frequency Tender auctioned off a total of 12 bandwidths each 8 MHz wide during the winter of 1990. The frequency range of 2.3 to 2.396 GHz (2,300 to 2,396 MHz) is within the range of frequencies utilised elsewhere in the world for something called MMDS/MDS (multipoint distribution service). Here, standard television bandwidths (8 MHz) are available for relatively short range 'broadcasting', or, at the user's option, point to point (microwave) relay. The frequency range involved is located at a 'crossover' in the spectrum where waves act like broadcast signals (radiating in a circle around the transmitting antenna) at distances essentially similar to UHF television broadcasting, or, at the user's option radiate in a straight line from one site to another for purposes of relaying signals between areas.

First introduced in the United States (1971), this region of frequencies has grown internationally to represent a lower-cost alternative to distributing television programming within a community or group of communities than cable television; it is often called 'wireless cable'. Although New Zealand has limited this application to 12 channels each 8 MHz wide, other regions in the world have set aside as many as 30 channels for this purpose.

Transmitter powers are typically in the 10-100 watt range although 'gain' in the transmitting antenna can 'multiply' the (effective) radiated power to several kilowatts (eirp). Because of the relative shortness of the transmitted wavelengths the receiving antennas are very small, even when compared to conventional UHF receiving aerials. Thus the antennas installed for reception can be placed on window ledges or against the outside wall of a home and by their small size attract very little or no notice.

In most MDS operations the service provider creates a television programming package of several channels and 'sells' reception of these packages in a manner very similar to cable TV sales; so much per month for an assortment (selection), or more per month for all of the channels available. In this way individual homes can select sports and news programming, for example, and by not selecting movie programming benefit from a lower cost service per month. With modern scrambling techniques and per-subscriber-addressable hardware, individual homes or commercial customers can even be directed individual programmes. Some systems use 'down time hours' (typically early morning) to transmit in service training for doctors or other professionals and during those hours only the subscriber units identified as belonging to (example) doctors would receive the unscrambled programming.

A typical 100 watt 2.3 GHz transmitter costs between NZ\$60,000 and \$150,000 FOB the factory; with transmitting antennas and necessary attachments. To this the operator must add programming equipment (tape decks, software) and signal scrambling equipment. MDS/MMDS receiving systems consist of set-top/antenna mount dual units plus a special antenna for the frequency range. Typical prices are in the region of NZ\$185 and upwards per receiving site; more for more sophisticated descrambler (option) packages. While best service is defined as being 'line of sight' (locations visible from the transmitting antenna location), distances in excess of 50km are possible with skillful engineering. Many MDS/MMDS systems begin without scrambling, confident the specialized receiving equipment will prevent most signal 'interlopers' from receiving their programming. However, inevitably as the service grows 'black market/bootleg' receiving systems appear in the marketplace and the system operator is forced to upgrade to scrambled transmissions to prevent non-authorized viewing.

New Zealand regulations allow virtually any technically feasible use of these 8 MHz bandwidths the operator might wish to employ. Uses are not limited to television programme distribution; nor one-way transmission. Wideband (high speed) computer networking, private two-way video networks are possible uses in addition to television programme delivery.

The twelve 'channels' sold off in the 1990 Management Rights Auction were at the time created around an analogue television 'model'; each 8 MHz bandwidth happens to be the bandwidth required for the transmission of an analogue television programme. However, more recent developments in compressed digital video (CDV) now make it possible for one of these 8 MHz wide bandwidths to handle simultaneously 4 to 8 separate television 'programmes'. Thus a company owning rights to two such 8 MHz bandwidths could, for example, presently transmit as many as 16 (8 x 2) digital TV channels; a company with 3 could transmit 24 and so on.

Rights holders and their channel widths are as follows:

- 1) Broadcast Communications Limited: 2300-2308 MHz (1 'channel')
- 2) Sky Telecommunications Limited: 2332-2340 MHz (1 'channel')
- 3) Multiband Television Limited: 2348-2356, 2364-2372 MHz (2 'channels')
- 4) Telecom Corp./NZ Ltd.: 2308-2316, 2316-2324, 2324-2332, 2340-2348, 2356-2364, 2372-2380, 2380-2388, 2388-2396 MHz (8 'channels')

Each channel is 'nationwide'; at the present time no regular use is believed underway.

WORLDWIDE STATUS OF TECHNOLOGY

-STATUS IN NEW ZEALAND-

Current to 10 November 1993

CABLE TV/FIBRE OPTIC CABLE

World: A free-for-all environment exists in the UK cable world as smaller operators are being acquired in consolidation moves by larger firms. The cause of the excitement is telephone; the combining of cable to the home/subscriber, and, local/national/international (digital) telephone services. Primary telephone provider BT is prevented by law from entering cable TV but cable firms are actually encouraged to enter telephone service. Mercury Communications, Britain's 'alternate' telephone service, is now 20% owned by a cable consortium and signing deals with other cable firms to interconnect. Cable TV in the UK has been only modestly successful, reaching some 480,000 homes with a penetration rate of under 15%. Most UK cable systems have 550 MHz bandwidth spectrum arranged for up to 60 TV channels, plus telephone. Success of telephone option is shown in statistics from ITC/Independent TV Commission: On October 01, 1992 cable TV had installed 61,158 residential telephone customers while on October 1st of this year number had grown to 216,432 joint telephone-cable TV subscriber homes. Newer systems are 750 MHz bandwidth but with digital compression on the horizon, few believe they will need next-generation 1 GHz bandwidth. USA/Canadian cable plants now rebuilding to at least 750 MHz bandwidth with fibre optic trunk and feeders. TCI will complete 11,000 km of fibre-rebuild plants in USA before mid-94. Some systems are 'passive', no cable amplifiers with fibre down to neighborhood nodes. Continental Europe CATV systems typically 450/550 MHz bandwidth and they await digital compression technology as means of 'catching up' to channel capacity common in North America. Germany and France still control cable TV through respective PTTs although (old) east Germany rapidly being rewired with state-of-art fibre loops (dual fibre) directly into the home. Traditional cable, fueled by satellite programme delivery, was growth industry in (mainland) China until government clamp-down on 'objectionable programming'; now Taiwan is 'hot'. India is next target of multinational cable entrepreneurs as well as several mid-African nations. Total cable-home universe estimated at 106 million of which 54,000,000 are in USA.

New Zealand: Telecom 600 home (potential) fibre optic test in New Lynn/Pakuranga suburbs of Auckland now 'partially' operational with 9 TV channels delivered in fibre to 'block' configuration, coaxial cable into homes. Original scheduled 'turn-on' date of 27 September didn't happen; last streets/homes are just now being activated. Learning-curve process required more complex section by section check-out and trouble shooting than originally envisioned by Telecom engineers. Telecom investor (Bell Atlantic) has received unexpected US court permission to engage in cable TV operations there (previously prohibited within their telephone service region) which may reduce importance of Auckland tests short term as Bell Atlantic can now 'test' fibre/coax plant in Arlington, Virginia (Washington, DC suburb). Longer term, with the 1994 completion of the Pacific (fibre optic) Cable Network ringing the Pacific Basin, the ability to transfer digitized broadcast TV programming via cable will enter the equation at about the same time as vastly enhanced satellite television transponder capacity comes on line (see in-depth report in this issue of **CTD**). Kiwi Cable TV, Paraparaumu, on coast north of Wellington, calls their 12 channel offering "pathway to the future". Between 20 and 30km of 1/2" 330 MHz bandwidth cable is operational serving estimated 300 homes. No new construction has been done in last 10 months while firm sorts out additional programming sources. TVs 1 and 2 were recently scheduled to be added to cable after protracted legal negotiations concerning potential copyright liability. Telecasts of local government meetings, local programming has been popular. Firm is 'experimenting' with manpower intensive MOD (movies on demand) service allowing subscribers to select from 1,000 film library and through analogue cable plant be 'delivered' movie of their choice at typically \$4. Rental movie stores had originally complained, claiming MOD was 'illegal' but later retracted statement and apologized for their 'error'. System is primarily owned by American entrepreneurs who are on leading edge of cable technology elsewhere. Paraparaumu cable plant is circa 1975 US technology, one-way, using reconditioned Magnavox (Philips) line amplifier equipment. Firm has 10 metre Scientific-Atlanta satellite dish receiving three programme sources (CNN, Worldnet and RFO/French) from Intelsat plus experimental 16 metre dish which they would like to expand to 20 metres for possible sports programming via non-Intelsat satellite. Other communities including Greymouth, Masterton, and small pocket-suburbs in Wellington are being paper-engineered for cable by various investors; PacSat firm would

like to begin limited service in initial sections of Greymouth by bringing in TV3 via knife-edge pickup point at Hokitika as early as Christmas.

DIGITAL RADIO/BROADCASTING

BBC World Service, aired in New Zealand on AM radio in Auckland, may soon be taking its feed via Intelsat 508 in digital form. Australian Aussat satellite currently carries feed in analogue form after receiving it via Indian Ocean Intelsat. BBC expansion using digital audio has gone ahead in parallel to expansion of BBC World Service Television in North America. By linking between Indian Ocean and Pacific Ocean Intelsats, BBC World Service radio will essentially have completed encircling the world via satellite.

National Public Radio, partly private/partly government funded non-commercial radio network akin to National Radio here, wants to be pioneer in DAB (Digital Audio Broadcasting, perhaps by satellites). Recent study focuses on types of audio 'programming' NPR and parent CPB should initially pursue and suggests (1) world news format, (2) radio version of C-SPAN (live television coverage of US House of Representatives and Senate debates/committee hearings) and (3) a radio version of 1994 planned cable TV network 'Horizons' which will pick up lectures, symposia and other events from academic and cultural facilities.

ITU (International Telecommunication Union) Radiocommunication Group has met in Geneva to discuss various options for BSS-S (Broadcast Satellite Service-Sound, or direct satellite broadcasting). Although it remains possible for a single company to build, launch and operate a proprietary satellite-based audio programming service, the preference at least at government levels is for establishment of worldwide or ITU zone (the world is in 3 zones) frequency assignments for uplink/downlink purposes. This would also simplify receiving equipment design if the full world or the world in 3 zones used the same downlink bands, channelization, and digital modulation format. Finding a non-cluttered downlink range is presently focusing on 2,310 - 2,360 MHz (2.3-2.36 GHz). This frequency range has been assigned to amateur (Ham) operators in many parts of the world but is lightly used. In New Zealand, 2.3 to 2.396 GHz has been sold in 8 MHz chunks (12 channels total) for management rights to Telecom, BCL, SKY Television and Multiband Television but none of the channels are believed to be in use at this time.

Ministry of Commerce's Ian Hutchings (Manager Radio Spectrum Operations) responding to CTD Official Information Act request said "No (New Zealand) broadcaster has yet formally sought to implement DAB." Apparently a radio frequency management rights holder could implement DAB in New Zealand without formal approval and Hutchings notes "Provided they comply with a licence there is no need to seek approval (of the Ministry) although it is likely that the emission designator on the licence may need to be altered. It is the emission designator which controls the power density in the emission bandwidth and this is a critical factor for co-channel computability."

DIGITAL TELEVISION/BROADCASTING

Digitally compressed video is very close to happening on wide scale. Worldwide adoption of MPEG-2 standard creates basic system parameters to which hardware designers and transmission companies can plan. Different potential user groups view digital compression with varying business plans. Telephone companies, with a business plan to sell television programming into the home, are constrained by "the last mile"; the bandwidth-limited copper 'twisted pair' wires that interconnect home subscribers with fibre optic trunks. A form of digital video compression, ADSL, can place a limited motion 'VHS grade' video picture through up to 2km of typical twisted pair but at considerable cost: from NZ\$3500 to NZ\$6000 per home before the first movie/programme is transmitted. Telco alternatives are to upgrade "the last mile" to fibre (or coaxial cable as a minimum) and worldwide many telcos routinely now install coaxial cable or fibre into the home with new subdivisions. Estimates that it will take ten years plus for 50% of existing 'twisted pair' circuits to be upgraded to 'fibre loops' seem optimistic although analysts say at this 'slow rate' telcos can fund this upgrade from internal cash flow. Japanese study recently completed estimated it would cost NZ\$505 billion for Japanese PTT to reach into 80% of Japanese homes with fibre optics; clearly not a number to be paid for from annual 'cash flow'. Anything approaching large scale use of ADSL, or rapid replacement of "the last mile" with fibre optics would require extensive outside borrowing/funding by telcos. Most consider this unlikely since the market demand for movies/programmes 'on demand' is still unproven. Cable TV, meanwhile, especially in USA and Europe, will rapidly embrace digital video compression because for average cost per home of NZ\$500 (versus \$3000-6000 for ADSL) cable firms can equip subscriber homes with digital decoders; under NZ\$7 per month per home amortized over 7 years. Cable already has the bandwidth capacity into the home to make use of expanded channel offerings and does not face telco's "last mile" copper-pair bottleneck.

Digital TV for conventional VHF/UHF telecasting faces a less certain future. In US, rules permit each broadcaster to transmit only a single programme at a time ruling out (without law changes) broadcasters becoming multiple-programme sources with digital techniques. Thus digital TV in US is concentrating on technical progression to widescreen/HDTV and multiple picture transmissions for the same programme (i.e., several different views of a sports match, all transmitted simultaneously allowing viewer to select view he/she wishes). FCC is suggesting 2008 date when analogue transmissions cease. In Europe, with few impediments to stop broadcasters from using digital as means of adding second, third, fourth (etc.) unrelated programmes to schedule, emphasis is on new programming rather than HDTV; but Europeans are in favour of widescreen upgrade. Because HDTV (high definition TV) requires 2-4 times the bandwidth of 625 line TV, even in compressed digital form, European broadcasters are shying away from expanded definition as adding programming choices is more market-important to them than adding higher quality reception. UK suggesting ten year transition from analogue to digital; other European countries planning 1994 decisions.

New Zealand: Ministry of Commerce claims no studies have yet been performed but digital ability to reduce transmitter powers to 1% of their (present) analogue values for same coverage is attractive to would-be planners. MOC has told **CTD** telecasters could implement digital TV here without changes in rules. A study announced July is looking at adding 48 MHz spectrum space (470-518 MHz) to unspecified users; this is bandwidth capable of supporting six new (analogue) TV channels (i.e. chs. 21-26) which some of those responding to MOC study have suggested could be used for digital TV transmission. Neville Lane, TVNZ Controller of Engineering in letter to **CTD** (13-10-93) notes "There are (certainly) no (TVNZ) plans for (television) transmission (by) digital methods. Apart from the uncertainty about viability and costs, the fact is that standards have been not set. I believe the standards must be common (on a worldwide basis) in order to reduce costs and prevent confusion in the marketplace." However, TVNZ Chairman Norman Geary in statement attached to 30 June 1993 financials spoke of 'coming competition from new digital TV services' and noted that minimum of four digital programme channels would be available in single analogue channel bandwidth. MOC's Ian Hutchings relates to **CTD** "New Zealand has, within its resources, been playing an active part in the promotion of new technologies ... it would be unrealistic to expect that New Zealand could determine appropriate technology for the world and it is recognised that world or at least regional standards are essential for effective market implementation of these (digital) services." BCL recently organised (ITU) Enhanced Digital Television Seminar workshop (Auckland, early October) and printed copies of the proceedings are reported available at 'modest cost': contact Mr. Ian Goodwin, BCL, P.O. Box 98, Wellington.

DIGITAL CONSUMER HARDWARE/SOFTWARE

Ten major VCR manufacturers (2 European, 8 Japanese) have agreed to agree on digital VCR standards: 25Mbits/second data rate (50Mbits/second HDTV), metal evaporated (or equivalent) 6.25mm tape width, 4.5 hours per standard cassette (1 hour in camcorder package), 4 channel digital stereo audio in PCM format using MPEG-2 standard. Because rental tapes can be digitally copied infinite number of times without degradation, a 'flag' will be included with programme material to prevent digital to digital machine dubbing. CD-I, interactive video discs, likely to be major consumer devices in 1994-95 market frame, have several formats which are not yet compatible. However, newest generation CD-I players all use MPEG-digital based standards and most (but not all) movies released on Video CDs will play on most video CD (or CD-I) players or through FMV (full motion video) cartridge adapters to be offered for interactive player units. Philips is presently primary advocate of Video CD technology but has major Japanese support for mid 1994 product releases. First generation digital design TV sets now available in Panasonic/Mitsushita lines but digital circuits presently comprise less than 30% of design. Several widescreen 'techniques' are now being shipped, some may not perform with digital widescreen transmissions eventually available. Each new model year from now on will expand digital erosion of traditional analogue circuits; real break through will be all-digital sets paralleled by analogue RF and display circuits during years when many countries (such as US) are simulcast transmitting in both analogue and digital formats. There remains much to be sorted out in the consumer digital video evolution; 1995-6 looks like years of first significant impact.

Digital 8 and 16-bit game designs giving away to 32-bit and by 1995 64-bit designs. Improvements speed up action, enhance on-screen resolution, allow for more complex graphics and software programmes. Most designers have brand-proprietary formats but analysts forecast shake out to one or at most two formats by 1996.

Audio CDs blending with interactive CD-ROMs and video CDs will all be affected by development of blue-laser technology. Blue laser has 460 nanometre definition (versus present red laser 780 nanometre) allowing much tighter

(2.3 times) packing of information on discs. It will not be backwards compatible; when available (1998-2000), if accepted as 'standard' all red laser products will be less useful than a 78rpm record is today.

Screen display technology is evolving into true flat (wall hanging) screens. Matsushita has been shipping first (14" diagonal) CFP (colour flat panel) for two months and forecasts three different direct-view display formats by 1995: much improved LCDs for 10" and down, CFP for 11-20" and shorter neck CRTs for 21" and up. Three new developments in projection technology vying for acceptance, all significantly better in performance (brightness, resolution, edge of screen focus, viewing angles) than existing systems. Major changes in projection systems expected by 1996.

SATELLITE TO HOME BROADCASTING

South Pacific region lags behind every other segment of globe in access to satellite television programming; even Bangladesh dish owner has typically 40 programme channels available. New Zealand has one full-time service (CNN) and viewers must 'track' satellite at that. First full-time compressed digital feeds (using probable-interim National Transcommunications Lab/NTL format) now functioning on Holland-Belgium Filmnet Astra satellite service using Scientific-Atlanta digital decoders at authorized cable headends. Scientific-Atlanta encoder/decoders also being used to upgrade 8 South American-beamed TV services via PanAmSat 1 over Atlantic. Digital video compression will blossom rapidly in satellite world principally because of economics: six to eight separate TV programmes can be transmitted simultaneously through a single satellite transponder (channel). With Europeans paying NZ\$9 million per year for a single satellite channel, 'sharing' cost with 7 other programmers can reduce costs to 1/8th per year; a significant savings. Additional benefits of digital: smaller dishes will produce higher quality pictures bringing consumer package prices down while offering more channels than at present.

Rupert Murdoch's News Corporation is expanding globally, will challenge CNN, ESPN and others with programming via Asiasat this year and next, plans coverage into Pacific 1995. Murdoch also pursuing use of digital and hopes to offer satellite delivered 'data base' for computer equipped terminals including constantly updated world-distributed 'electronic newspaper'. US Ku band 150 channel digitally compressed services will launch by June 1994; Thomson is building consumer terminals which will have NZ\$1200 price-tag and Sony has been licensed by to offer same package of equipment.

Four, perhaps five, new satellites will be functional with coverage for South Pacific by end of 1994/early 1995. This will end the 'transponder bottleneck' which now limits the development of programming networks here. See feature report this issue of CTD.

TERRESTRIAL/SKY TO HOME IN NEW ZEALAND

TV3 expansion via transmitters at Mt Studholme, Oamaru, Putauaki originally scheduled for completion this month. Presently, TV3 is studying several methods of increasing coverage into west coast of South Island and north of Whangarei on North Island. Conventional approaches, using existing BCL operated transmitter sites and medium to high power transmitters, could be replaced with multiple lower power (UHF) relays. TV3 may be sensitive over allowing its signal to be translated via UHF channels, worried that consumers will not respond with appropriate UHF home aerial systems and channel will suffer in all-important "ratings battle" against TV1 and 2. By strange twist of network economics, station is better off with no coverage in area than with coverage which consumers consider 'inferior' since homes equipped with '(programme rating) viewing dairies' where TV3 does not exist do not count as much against network as homes inside of theoretical TV3 coverage zones but receiving inferior quality pictures. TV3 expansion north of Whangarei complicated by co-channel interference. Ideally, TV3 on Horokaka (channel 9V) would be taken 'off-air' for new regional transmitters at Hikurangi (channel 10H) and thence Maungataniwha (channel 4V). Unfortunately, TV3's channel 9V Ruru location (east of Hamilton; 482m ASL) produces heavy co-channel interference for Horokaka on same channel high percentage of time in areas north of Whangarei. Using conventional technology, to continue taking TV3 off-air north from Horokaka would require shifting either Horokaka or Ruru transmitters from channel 9(V); an expense TV3 may be reluctant to pay to gain estimated 43,400 people (combination of) Hikurangi and Maungataniwha would reach. Ruru presently reaches estimated 262,000 people. A new channel 11 translator for TV3, fed by Horokaka (9V), is now serving Russell (Bay of Islands).

A significant change may be occurring within the policy that has guided extension of TV service into rural ('non-commercial') regions. In 1991-92 NZOA paid TVNZ subsidiary BCL \$3,330,000 which BCL invoiced to NZOA for maintenance of an estimated 700 transmission channels (typically 2 channels - 1 each TV1 and 2 - per site). Under statutory provision in act creating New Zealand On Air, out of broadcasting fees collected annually, NZOA is

to 'maintain the level of transmission service achieved by the Broadcasting Corporation of New Zealand as of 1 April 1988'. The sites serve from 1 family to at most a few thousand families and their original construction cost was paid out of BCNZ funds between 1976 and 1988. TVNZ has labeled these sites as 'non-commercial' indicating they believe the number of people served per site is so small as to not warrant the original construction cost, nor the annual maintenance costs, if the sites are to be considered in the context of normal 'broadcast economics'. NZOA assumed the financial responsibility for the annual upkeep on these sites as part of a wider programme of assuring at least some (TVs 1, 2) television service to all New Zealanders. BCL has a contract to keep the sites functioning and assigns regular technical personnel to this task. From the outset, NZOA's concept of cost accounting and that of BCL have been out of sync. NZOA wanted site by site breakdown of annual costs; BCL favoured single summarized invoice and an annual number (i.e., \$3,330,000 July 01 1991-June 30, 1992). During most recent NZOA fiscal year, outside expertise from Southpac Corporation was brought in to study the costs which Southpac believed should apply to annual maintenance programme. As noted in the 1992-93 NZ On Air Annual Report (issued 20 September). *"This work indicates that the level of NZ On Air subsidy required to make this transmission commercially viable is significantly lower than previously estimated."* Accordingly, NZOA lowered 1992-1993 'allowance' to \$638,000 (less than 1/5th of previous year payment) but cautions in report *"This allowance is still subject to negotiation with TVNZ..."*

SKY TV's Videocrypt encoded 3 channel service for Hawkes Bay (via Mt Erin) originally due in December will apparently not be 'commissioned' until March; possible channels and EIRP power levels are 29 (51 dBw EIRP), 33 (51 dBw EIRP), and 45 (51 dBw EIRP). Although SKY is authorized for 51 dBw from Mt. Erin, their Director of Engineering (Brian Green) suggests power will be 42 dBw with sculptured pattern down 3 dB or more in some directions (i.e., NNE across Hawkes Bay towards Wairoa). Tony Rodgers was scheduled to be in Napier coordinating new Hawkes Bay SKY service after 22 November. SKY's service for Dunedin (originally scheduled for February) could use (via Mt Cargill) any 3 of 28 (60 dBw EIRP), 30 (29 dBw EIRP), 32 (60 dBw EIRP), 34 (29 dBw EIRP), 44 (60 dBw EIRP), 46 (29 dBw EIRP), 52 (60 dBw EIRP), 54 (29 dBw EIRP) or 62 (29 dBw EIRP).

New Christchurch commercial channel, CRY TV, operating on channel 56 has authorized maximum power of 29 dBw EIRP at Marleys Hill (502m ASL; south of Christchurch above Governor's Bay and actually 6m taller than Sugarloaf). Station's initial programming primarily music videos; 9th TV channel for Christchurch.

New (music TV/Max) channel for Auckland began operation on channel 49 late in October. Channel is authorized for 45 dBw EIRP (14 dB lower than SKY/TAB) from common Waitarua site; plans early December upgrade to Pine Hill site as well. Schedule is 7AM-12mid daily, 8th TV channel for Auckland

TVNZ's closed captioning (transmission of text-form spoken dialogue coinciding with on-screen dialogue) is carried on Line 21 of the television programming; approximately 10% of broadcast day is presently captioned for hearing impaired. TV sets equipped with Teletext adapters have built-in access on page 801 where schedule for each day also appears. TVNZ has been requested to expand closed captioning to more programmes, possibly adding Maori as well. Costs are quite monumental; most programmes now captioned come from UK or Australia with captions 'built-in'; TV One News is locally captioned 'on-line' as the programme goes to air.

NEXT ISSUE OF CTD:

ISSUE DATE: 17 DECEMBER

PRIMARY REPORT: SATELLITE TV
PART TWO / THE BUSINESS OPPORTUNITIES

ADDITIONAL RECOMMENDED READING:

TECH BULLETIN issues 9305, 9401

Cable Television / The Business

\$30 from R.B. Cooper, P.O. Box 330, Mangonui, Far North

SATELLITE TV: PART TWO

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Coop's Technology Digest wraps up our analysis of the brand-new satellite (TV) world in the next issue: in the mails to you fast-post on 17 December. Available only by subscription (or you may order our Satellite TV Package of two issues).

A great deal of money will be made in the home-satellite TV dish marketing industry in New Zealand. If 1% of Kiwi homes buy a home satellite system the first year it will be a \$39,600,000 business. At 5% the business will generate \$198,000,000 in sales. And that's just for the hardware. Ongoing, monthly satellite subscription and programme authorisation services will pile up \$6,864,000 per year at the 1% penetration level; \$34,320,000 at the 5% penetration point. Will you and your firm be ready to participate? Don't miss our next issue where all of the facts and projections are spread out for you to study; the perfect Christmas-holiday read!

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COOP'S TECHNOLOGY DIGEST

-The World of Communications-

(10 December 1993)

TAB's announcement on 09 December awarding the unused TAB (television) transmitter air-time to Sky Network further complicates the development of alternate television broadcasting services in New Zealand. As reported on pages 37 and 38 in this issue of CTD, SKY already has Management Rights on 174 (UHF) channels throughout New Zealand. In most of the 'market regions' Sky owns four UHF 8 MHz wide analogue channels and where active Sky now uses three of these four channels. The company has admitted it is carefully studying the development of compressed digital video (CDV) technology and considering the use of its fourth (presently unused) UHF channel for CDV transmissions "*when the technology is mature.*"

By contracting with TAB for their unused UHF transmitter air-time, Sky is able to launch a partial-day service without further investment in BCL transmitters and sites while still retaining their unused fourth channel for future expansion. TAB presently has transmitters at Auckland (55H + 58V and 53H), Te Aroha (56H), Kopukairu (50V), Pukepoto (55V) and Wellington (56H, 58H and 58V). With the agreement to use TAB's unused air-time, Sky will be able to initiate a microwave interconnected service to all of these transmitter sites on relatively short notice.

Sky will not be able to use TAB transmitters Friday evenings, Saturdays (approximately 10:30AM to 11:30 PM) but it will gain five prime evenings (Sunday - Thursday). It is also possible Sky will extend service beyond the present TAB reach to other areas (such as Hawkes Bay, Dunedin) through a combination of unused TAB channels and Sky unused channels.

The major unknown is the type of programming Sky will place on this new part-of-day service channel. With one-each movie, sporting and news service channel, the most major 'missing' programme segment might be music television; in the MTV mold (see page 20 here). However, at the present time no MTV feed is available on the Pacific Ocean Region satellite (180 degrees east) and the costs associated with taking a live feed of MTV are beyond the likely budget for Sky. Taking MTV on tape, homogenising it with New Zealand/Pacific music, and creating a unique to Sky music service would be a more practical approach. Both Auckland and Christchurch already

have music television channels, but both suffer from low transmitter powers and neither has the financial resources of Sky and its largely American owners.

More likely than a single 'dedicated format' service is something Sky execs refer to as the 'USA Channel Look'. This North American popular format mixes children's, women's programming with music (ala MTV) and other 'specials' into a general service channel that largely targets youthful viewers and women viewers in different day-parts. Additionally, CTD sources in London insist that when TVNZ begins taking digital feeds via satellite (February; see page 18 here) there will be a major expansion of programming sent here from the UK; including virtually the total daily BBC-1 and BBC-2 programming schedules. While it is true that some of these schedules are already used by New Zealand's TV1, and other portions of the BBC-1 and 2 schedule are not licensed to the BBC for direct use outside of the UK, there still remains within the BBC-1 and 2 schedules many hours per day which Sky might negotiate to use here.

Pricing. Sky insists no decisions have yet been made how they will price the new service but there are indications that at least initially the fourth channel using TAB transmitters might not be charged separately; nor will there be an increase in Sky charges for the new expanded service. Ultimately, Sky would like to 'tier' channels and offer perhaps 3 as a 'basic package' (presently \$43 per month) and offering two more as an optional 'tier' for additional monthly charges. How all of this shapes up in future years will depend upon the availability of compressed digital video (CDV) hardware for the home subscriber; 1996 time frame.

Retrofitting. Motels/hotels with dedicated Sky conversion/descrambler packages now equipped for three Sky channels will require upgrading with additional signal processing equipment for the fourth Sky encrypted channel. Facilities that have already been equipped for TAB's channel will require the addition of descrambling equipment for that channel to cover the hours per week when Sky, rather than TAB, is using the channel.

We regret that given the necessity to place this issue into the mails before 5PM on Friday 10 December we are not able to develop this report to its factual conclusion and many technical questions remain unanswered including how Sky's commercial (motel/hotel) customers will be retrofitted with the equipment necessary to descramble a fourth Sky service channel.

CORRECTION/ this issue, pages 37-38: In the analysis of UHF Management Right(s) channels, appearing on pages 37-38 in this issue, please note United Christian Broadcasters (TV) Ltd. does in fact have a UHF channel at the Waatarua (Auckland) site. We regret the error which appeared in our source material originally supplied by the Ministry of Commerce.